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TM 11-5826-207-24

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL AND
FIELD MAINTENANCE

RADIO RECEIVING SETS
AN/ARN-30A, AN/ARN-30B
AND AN/ARN-30C

SALVAGE

HEADQUARTERS, DEPARTMENT OF THE ARMY
MAY 1959

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By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWEL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

ASA (2)
CNGB (1)
Technical Stf, DA (1) except CSigO (30)
Technical Stf Bd (1)
USCONARC (5)
USA Arty Bd (1)
USA Armor Bd (1)
USA Armor Bd Test Sec (1)
USA Inf Bd (1)
USA Air Def Bd (1)
USA Air Def Bd Test Sec (1)
USA Abn & Elct Bd (1)
USA Avn Bd (1)
USA Arctic Test Bd (1)
US ARADCOM (2)
US ARADCOM Rgn (2)
OS Maj Comd (5)
OS Base Comd (5)
Log Comd (5)
MDW (1)
Armies (5) except First US Army (7)
Corps (2)
Div (2)
USATC (2)
Fld Comd, Def Atomic Spt Agcy (5)
Yuma Test Sta (2)
USA Elct PG (1)
Svc Colleges (5)
Br Svc Sch (5) except USASCS (25)
Gen Depot (2) except Atlanta Gen Depot (None)
Sig Sec, Gen Depot (10)
Sig Depots (17)
AFIP (1)
WRAMC (1)
AMS (1)
Engr Maint Cen (1)
USA Comm Agcy (2)
USA Sig Comm Engr Agcy (1)
USA Sig Eqp Spt Agcy (2)
USA Sig Msl Spt Agcy (13)
Trans Terminal Comd (1)
Army Terminals (1)
Port of Emb (OS) (2)
OS Sup Agcy (2)
Sig Fld Maint Shops (3)
Sig Lab (5)
Mil Dist (1)
USA Corps (Res) (1)
Sectors, USA Corps (Res) (1)
TASSA (15)
Midwestern Rgn Ofc (TASSA) (1)
JBUSMC (2)
USA Sig Pubs Agcy (8)
Army Pictorial Cen (2)
USA Ord Msl Comd (3)
Units organized under following TOE's:

5–500 AA–AD (2)	11–117 (2)
11–7 (2)	11–155 (2)
11–15 (2)	11–500 AA–AE (2)
11–16 (2)	11–587 (2)
11–57 (2)	11–592 (2)
11–98 (2)	11–597 (2)

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, see AR 320–50.

***This manual supersedes so much of TM 11–520A, 8 October 1957, including C 1, 20 November 1957, as pertains to second through fourth echelons.**

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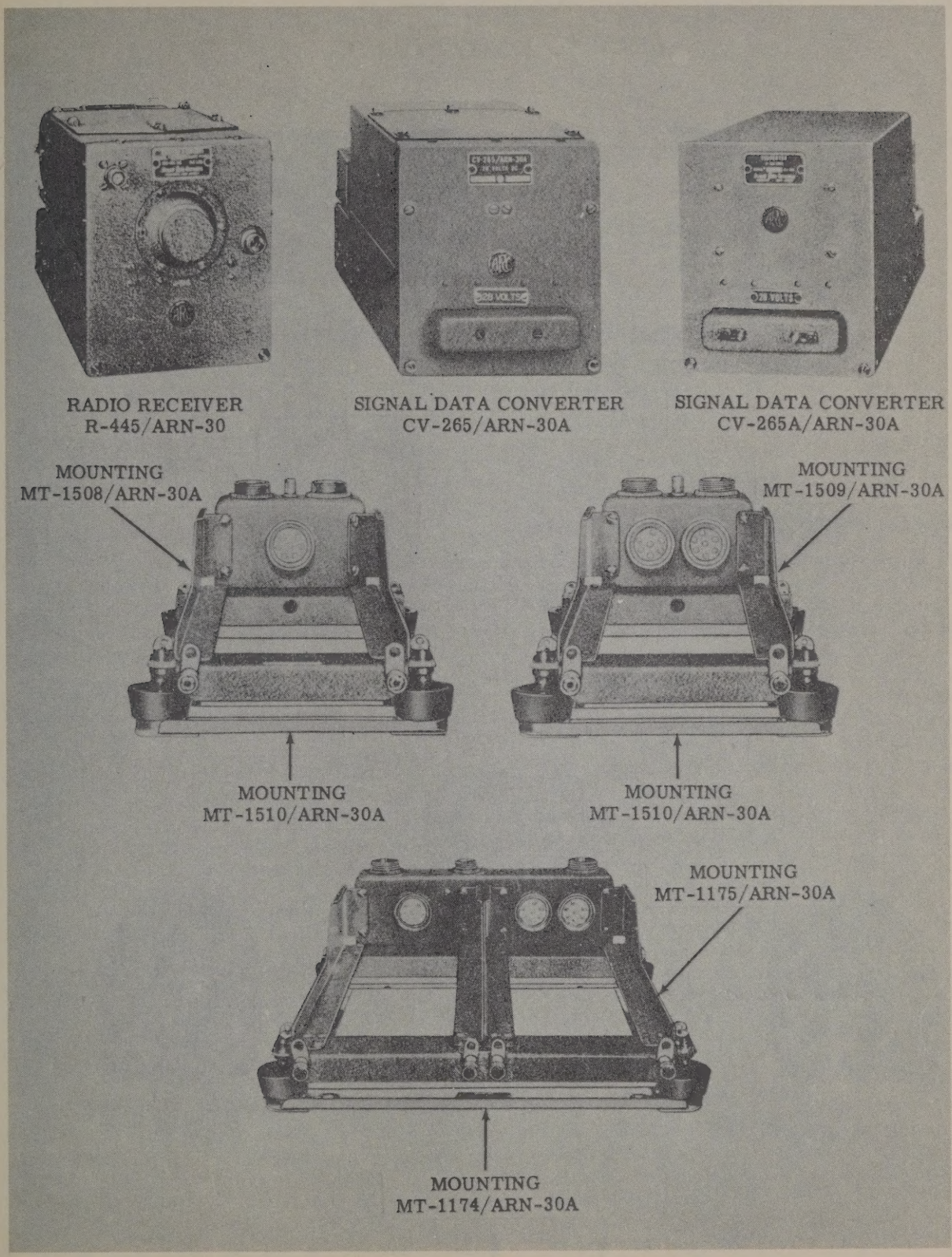


Figure 1-1. Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C (Sheet 1 of 2)

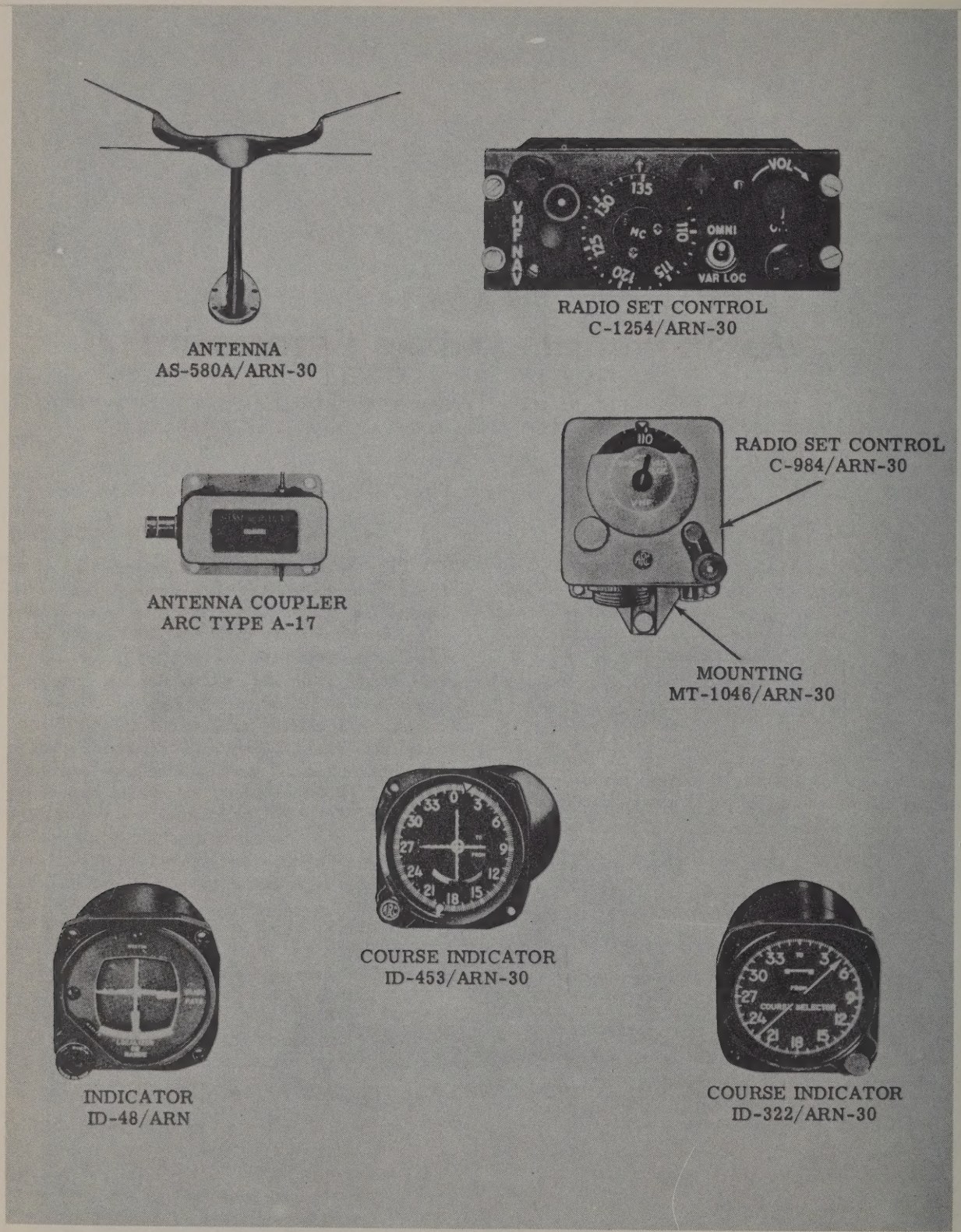


Figure 1-1. Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C (Sheet 2 of 2)

SECTION I
DESCRIPTION AND LEADING PARTICULARS

1-1. PURPOSE OF HANDBOOK.

1-2. This handbook provides service instructions for Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C. (See figure 1-1.) All statements in this handbook apply to all sets except when referenced to one or more specific sets.

1-3. PURPOSE OF EQUIPMENT.

1-4. Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C (each hereinafter referred to as the set) are airborne radio receiving sets with a frequency range of 108 to 135 megacycles designed to receive the following vhf radio airways facilities:

Vhf-omnidirectional range (VOR); visual-aural range (VAR); 90/150 cps runway localizers; voice reception on the complete band of frequencies covered within the range of 108 to 135 megacycles simultaneously with the available navigation facilities if desired.

1-5. OPERATING LIMITATIONS.

1-6. DISTANCE RANGE. The distance range of the equipment is dependent on the altitude of the aircraft and the surrounding terrain. In general, the distance range may be determined by the formula:

$$D = 1.2\sqrt{H}$$

where D = Approximate distance in miles
H = Height in feet

The range of a VOR station usually exceeds this "horizon distance" by 10 to 20 percent.

1-7. TEMPERATURE AND ALTITUDE LIMITS. The sets are designed to operate satisfactorily at any altitude up to 50,000 feet, and at temperatures ranging from −55°C (−67°F) to +55°C (+131°F).

1-8. FUNCTIONAL OPERATION OF EQUIPMENT.

1-9. Each set consists of the following types of units (figure 1-1): a receiver, a converter, a dynamotor, a control unit, a cross-pointer indicator, an omni-bearing course indicator (both indicator functions can be combined in one two-purpose indicator), a one-rack common mounting for the receiver and converter or two individual-rack mountings for the receivers and converters, shock mountings for each type of rack and for Radio Set Control C-984/ARN. (Refer to table 1-1.) Cable connectors and mechanical linkage parts are also supplied. (Refer to table 1-2.) Radio signals, transmitted by VOR, VAR, or localizer facilities, are picked up at the antenna, tuned by the receiver under control of the control unit, and fed through the receiver mounting to the control unit, where the volume level is set, and thence to the aircraft ICS. The navigation portion of the received signal is fed to the converter which converts the signal into information for presentation on whatever indicators are in use. The type of radio signal received is determined by the position of the OMNI-VAR LOC switch on the control unit. Refer to Section IV for further details.

1-10. LEADING PARTICULARS.

1-11. GENERAL. The major units, mechanical linkage, and interconnecting parts supplied as part of the sets are shown in figures 1-1 and 1-2. The quantity of major units supplied with each set are listed in table 1-1. Refer to table 1-2 for the quantity of interconnecting parts supplied. For a comparison listing of major units for each set, refer to table 1-7.

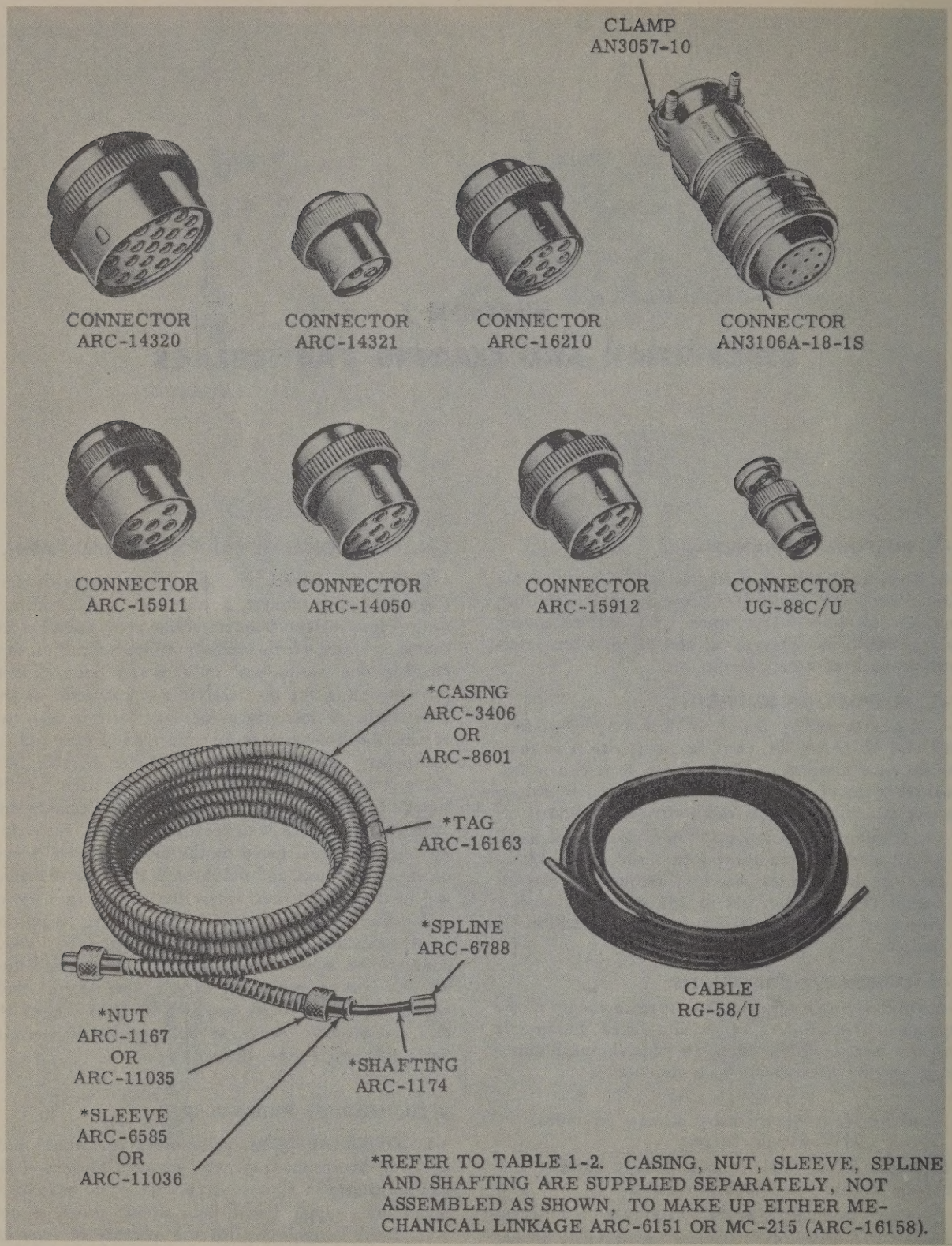


Figure 1-2. Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C, Interconnecting Parts

TABLE 1-1. MAJOR UNITS SUPPLIED

Short Form Name	*Type Designation*	*Quantity Per Installation*		
		AN/ARN-30A	*AN/ARN-30B*	*AN/ARN-30C*
Antenna	AS-580A/ARN-30[1]	1	1	1
Antenna Coupler	A-17[1]	1	1	1
Control Unit	C-984/ARN-30[2]	1	1	1
Control Unit	C-1254/ARN-30[2]	1	1	1
Converter	CV-265/ARN-30A	1	—	—
Converter	CV-265A/ARN-30A	—	1	1
Course Indicator	ID-322/ARN-30	1	1	—
Course Indicator	ID-453/ARN-30	—	—	1
Dynamotor	DY-86/ARN-30	1	1	1
Indicator	ID-48/ARN	1	1	—
Mounting	MT-1046/ARN-30	1	1	—
Mounting	MT-1174/ARN-30A[3]	1	1	1
Mounting	MT-1175/ARN-30A[3]	1	1	1
Mounting	MT-1508/ARN-30A[4]	1	1	1
Mounting	MT-1509/ARN-30A[4]	1	1	1
Mounting	MT-1510/ARN-30A[4]	1	1	1
Receiver	R-445/ARN-30	1	1	1

[1] Antenna AS-580A/ARN-30 is normally supplied for use on all aircraft, except jet aircraft. In jet aircraft, Antenna Coupler ARC Type A-17 is installed inside canopy with two 1/8-inch diameter rods (not supplied), each about 26 inches long, forming the dipole. The antenna coupler may also be used to match a dipole antenna mounted on the vertical fin, to a standard 50-ohm coaxial cable.

[2] Radio Set Control C-984/ARN-30 with Mounting MT-1046/ARN-30, and Radio Set Control C-1254/ARN-30 are interchangeable functionally but not physically.

[3] Mounting MT-1174/ARN-30A and Mounting MT-1175/ARN-30A are supplied for a one-rack installation when the receiver and converter are mounted on a common rack.

[4] Mounting MT-1508/ARN-30A, Mounting MT-1509/ARN-30A, and Mounting MT-1510/ARN-30A are supplied for a two-rack installation when the receiver and converter are mounted on individual racks.

TABLE 1-2. INTERCONNECTING PARTS SUPPLIED

Short Form Name	*Type Designation*	*Quantity Per Installation*					
		AN/ARN-30A		*AN/ARN-30B*		*AN/ARN-30C*	
		One-Rack	*Two-Rack*	*One-Rack*	*Two-Rack*	*One-Rack*	*Two-Rack*
Cable	RG-58/U	AR	AR	AR	AR	AR	AR
Clamp	AN3057-10	1	1	1	1	—	—
Connector, coaxial	UG-88C/U	2	4	2	4	2	4
Connector, plug	ARC-14050	2	2	2	2	2	2
Connector, plug	AN3106A-18-1S	1	1	1	1	—	—
Connector, plug	ARC-14320	—	—	—	—	1	1
Connector, plug	ARC-14321	1	—	1	—	1	—
Connector, plug	ARC-15911	1	1	1	1	—	1
Connector, plug	ARC-15912	—	1	—	1	1	1
Connector, plug	ARC-16210	—	1	—	1	—	1

TABLE 1-2. INTERCONNECTING PARTS SUPPLIED (Cont)

Short Form Name	*Type Designation*	*Quantity Per Installation*					
		AN/ARN-30A		*AN/ARN-30B*		*AN/ARN-30C*	
		One-Rack	*Two-Rack*	*One-Rack*	*Two-Rack*	*One-Rack*	*Two-Rack*
Shafting	ARC-1174[1, 2]	AR	AR	AR	AR	AR	AR
Nut	ARC-1167[1] or ARC-11035[2]	2	2	2	2	2	2
Casing	ARC-3406[1] or ARC-8601[2]	AR	AR	AR	AR	AR	AR
Sleeve	ARC-6585[1] or ARC-11036[2]	2	2	2	2	2	2
Spline	ARC-6788[1, 2]	2	2	2	2	2	2
Tag	ARC-16163[2]	1	1	1	1	1	1

[1]These items, when assembled, make up Mechanical Linkage ARC-6151.
[2]These items, when assembled, make up Mechanical Linkage MC-215(ARC-16158).

1-12. EQUIPMENT REQUIRED BUT NOT SUPPLIED. The required equipment that is not supplied consists of sufficient AN16 and AN20 bulk wire to fabricate the required wiring harness. The length of wire is determined by the set used and by the location of the units in the aircraft in which the units are installed. All connectors for the wiring harness and all parts for the mechanical linkage listed in table 1-2 are supplied, as well as connectors and coaxial conductor for the r-f cables.

1-13. ELECTRON TUBE COMPLEMENT. Only the receiver and converter contain electron tubes. The quantity, type, and function of these electron tubes are listed in table 1-3.

TABLE 1-3. ELECTRON TUBE COMPLEMENT

Quantity	*Type*	*Function*
	RADIO RECEIVER R-445/ARN-30	
1	9003	First r-f amplifier
1	9003	Second r-f amplifier
1	9003	Mixer
1	9002	R-f oscillator
1	14A7	First i-f amplifier
1	14R7	Second i-f amplifier and avc
1	14R7	Third i-f amplifier and avc
1	14F7	Detector, noise limiter, first audio amplifier
1	12A6	Second audio amplifier

TABLE 1-3. ELECTRON TUBE COMPLEMENT (Cont)

Quantity	*Type*	*Function*
	SIGNAL DATA CONVERTER CV-265/ARN-30A	
1	12AT7 or 6201	10-kc amplifier (each section)
1	12AX7 or 6201	30-cps amplifier (one section only)
1	12AT7 or 6201	30-cps amplifier (each section)
1	12AT7 or 6201	Cathode follower/30-cps amplifier
1	12AU7 or 6201	AF 90/150-cps audio amplifier (each section)
	SIGNAL DATA CONVERTER CV-265A/ARN-30A	
2	5670	10-kc amplifier (one section each) 30-kc amplifier (one section each)
1	5670	Cathode follower, 30-cps amplifier
1	5887WA	Limiter
1	5751	30-cps amplifier (both sections)
1	5814	30-cps amplifier, 90/150-cps amplifier

1-14. FUSE COMPLEMENT. The sets do not contain any fuse or other overload protective device; however, provision should be made to incorporate such a device, rated at approximately 20 amperes, in the primary power source wiring.

1-15. TECHNICAL CHARACTERISTICS. Table 1-4 summarizes the electrical and electronic characteristics of the receiver, converter, and dynamotor.

1-16. WEIGHTS AND DIMENSIONS. Weights and dimensions of all units and interconnecting parts supplied are listed in table 1-5.

1-17. OPERATING CONTROLS.

1-18. All operating controls necessary for operation of the sets are located on Radio Set Control C-984/ARN-30 (figure 1-3) or Radio Set Control C-1254/ARN-30 (figure 1-4) and Course Indicator ID-322/ARN-30 (figure 1-5) or Course Indicator ID-453/ARN-30 (figure 1-6). Though no operating controls are located on Indicator ID-48/ARN, visual indications observed on Indicator ID-48/ARN together with the indications observed on Course Indicator ID-322/ARN-30 are essential for the proper use and operation of Radio Receiving Set AN/ARN-30A and AN/ARN-30B. Table 1-6 identifies the controls, and their functions, provided for operation of the set in use.

TABLE 1-4. TECHNICAL CHARACTERISTICS

RADIO RECEIVER R-445/ARN-30	
Frequency Range:	108-135 mc (continuously tunable)
Frequency Stability:	Drift for temperature changes from −55°C (−67°F) to +55°C (+131°F), at any frequency within the frequency range, from 3 minutes after applying power to the time of maximum drift, does not exceed 0.04%
Audio Output:	170 milliwatts at avc knee (at approximately 6 microvolts input), 360 milliwatts at 100,000 microvolts input with 30% modulation at 400 cps, into a 300-ohm load
Sensitivity:	2 microvolts or better throughout the frequency range for 10 milliwatts with 30% modulation at 400 cps, into a 300-ohm load
Selectivity:	Total bandwidth 100 kc for 6 db, 350 kc for 60 db
Intermediate Frequency:	15 mc
Input Voltage:	28 volts dc
Power Supply:	Dynamotor DY-86/ARN-30
Filament Current Requirement:	600 ma
Tuning Accuracy:	Better than 0.2%

TABLE 1-4. TECHNICAL CHARACTERISTICS (Cont)

SIGNAL DATA CONVERTER CV-265/ARN-30A AND CV-265A/ARN-30A	
Input Voltage:	28 volts dc
Filament Current Requirement:	450 ma
DYNAMOTOR DY-86/ARN-30	
Manufacturer:	Continental Electric Co. Newark, N. J.
Manufacturer's Part No:	Continental Type DMX 310
Contractor's Part No:	ARC-14402
Contractor's Type No:	D-10A (28V)
Rated Input Voltage:	27.5 volts dc
Rated Input Current:	1.70 amperes
Rated Output Voltage:	250 volts dc
Rated Output Current:	85 ma
Ambient Temperature:	−55°C (−67°F) to +71°C (+159.8°F)
Temperature Rise:	55°C (67°F)
Rated Speed:	7000 rpm
Altitude Rating:	40,000 ft maximum

Figure 1-3. Radio Set Control C-984/ARN-30

TABLE 1-5. WEIGHTS AND DIMENSIONS

Nomenclature	*Weight (lb)*	*Over-all Dimensions[1] (in.)*		
		Height	*Width or Diameter*	*Depth*
UNITS				
Antenna AS-580A/ARN-30	3.6	10-1/4	28	21-1/4
Radio Receiver R-445/ARN-30	8.6[2]	5-5/8	4-27/32	11-1/2
Signal Data Converter CV-265/ARN-30A	5.8	5-5/8	4-27/32	11-1/2
Signal Data Converter CV-265A/ARN-30A	6.1	5-5/8	4-27/32	11-1/2
Mounting MT-1175/ARN-30A	2.3	3-7/8	9-11/16	13-1/8
Mounting MT-1174/ARN-30A	0.7	1-1/2	11-5/8	10-23/32
Mounting MT-1508/ARN-30A	1.3	4-1/16	6	13-1/8
Mounting MT-1509/ARN-30A	1.3	4-1/16	6	13-1/8
Mounting MT-1510/ARN-30A	0.8	1-1/2	6-7/8	10-15/16
Dynamotor DY-86/ARN-30	[3]	—	2-3/4	4-27/32
Radio Set Control C-984/ARN-30	0.7[4]	4-5/8	3-1/8	2-15/16
Mounting MT-1046/ARN-30	[5]	4-19/32	3-1/8	5/16
Radio Set Control C-1254/ARN-30	0.8	2-9/32	5-3/4	3-3/4
Indicator ID-48/ARN	1.8	3-1/4	3-1/4	4-13/16
Course Indicator ID-322/ARN-30	1.5	3-1/4	3-1/4	5-5/16
Course Indicator ID-453/ARN-30	3.3	3-1/4	3-1/4	7-5/32
Antenna Coupler ARC Type A-17	0.1	1	1-9/16	3-1/8
INTERCONNECTING PARTS				
Clamp AN3057-10	0.05	—	1-3/16	1-1/8
Connector AN3106A-18-1S	0.1	—	1-5/16	2
Connector ARC-14050	0.07	—	1-5/16	1-1/4
Connector, plug ARC-14320	—	—	1-5/16	1-5/8
Connector ARC-14321	0.04	—	1-1/16	1-1/32
Connector ARC-15911	0.07	—	1-5/16	1-1/4
Connector ARC-15912	0.07	—	1-5/16	1-1/4
Connector, plug ARC-16210	—	—	1-1/4	1-3/16
Connector UG-88C/U	0.02	—	27/64	31/32
Mechanical Linkage ARC-6151 or MC-215(ARC-16158)[6]	0.12/ft	—	5/8	—
Cable RG-58/U	0.07/ft	—	0.195	—

[1] Over-all dimensions do not include mountings.

[2] Includes weight of Dynamotor DY-86/ARN-30.

[3] Included in weight of Radio Receiver R-445/ARN-30.

[4] Includes weight of Mounting MT-1046/ARN-30.

[5] Included in weight of Radio Set Control C-984/ARN-30.

[6] Not supplied assembled.

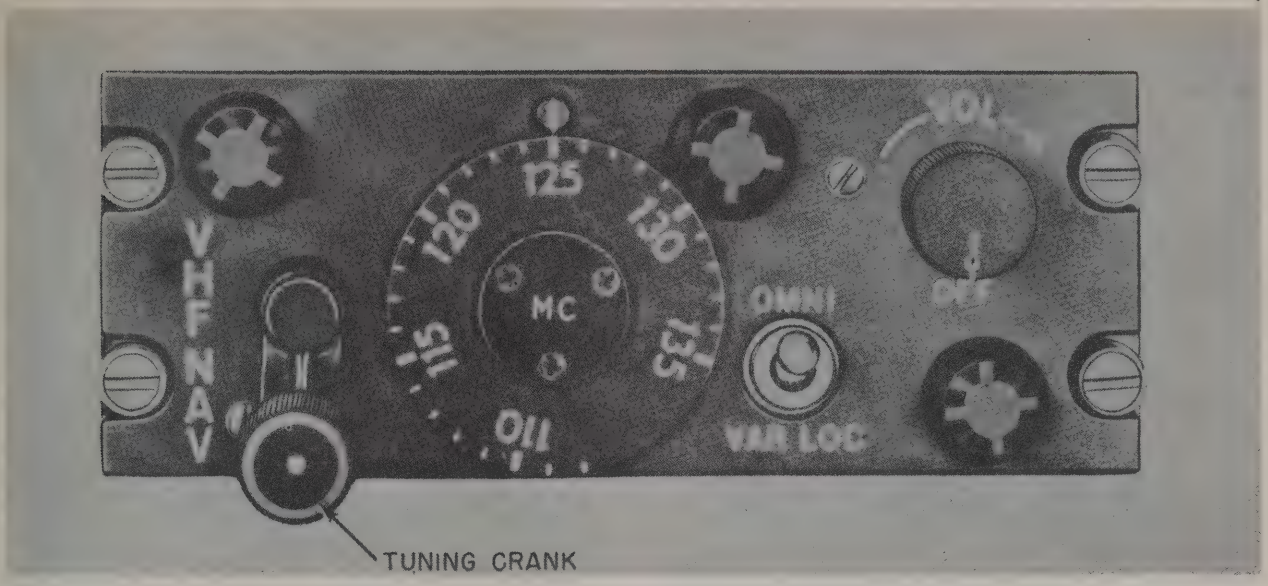


Figure 1-4. Radio Set Control C-1254/ARN-30

TABLE 1-6. OPERATING CONTROLS

Component	*Control Designation*	*Function*
Radio Set Control C-984/ARN-30 or Radio Set Control C-1254/ARN-30	OFF	Combination on-off switch and volume control. Controls application of power to set; rotation clockwise (direction of arrow) turning power on. Further clockwise rotation increases audio level of Radio Receiver R-445/ARN-30.
	OMNI-VAR LOC	Function selector switch. In OMNI position, equipment provides track information, as chosen by operator, when tuned to selected VOR ground station. In VAR LOC position, equipment is set up for operation with either VAR or localizer signals.
	Tuning Crank (no panel markings)	Through interconnection of mechanical linkage, remotely tunes Receiver.
Course Indicator ID-322/ARN-30 or Course Indicator ID-453/ARN-30	COURSE SELECTOR knob	Selects or determines magnetic bearing of aircraft from VOR station being received.

1-19. COMPARISON OF RADIO RECEIVING SET AN/ARN-30, AN/ARN-30A, AN/ARN-30B, AND AN/ARN-30C.

Note

The following information is provided for reference purposes only. This handbook does *not* cover Radio Receiving Set AN/ARN-30. Refer to AN 16-45-131 (Operation Instructions), AN 16-45-132 (Maintenance Instructions), and AN 16-45-133 (Illustrated Parts Breakdown) for information on Radio Receiving Set AN/ARN-30.

1-20. Radio Receiving Set AN/ARN-30, manufactured by Aircraft Radio Corp., Boonton, N. J., is commercially identified by the manufacturer as Navigation-Communication Receiver Type 15C. Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C, also manufactured by Aircraft Radio Corp., are commercially identified as Navigation-Communication Receiver Type 15D. Reference to all sets or units thereof in this handbook are by AN nomenclature only. The units of AN/ARN-30, though assigned AN nomenclature, carry commercial-designation nameplates. The units of AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C carry AN nomenclature nameplates. Because of the functional similarity of all the sets, and the inter-

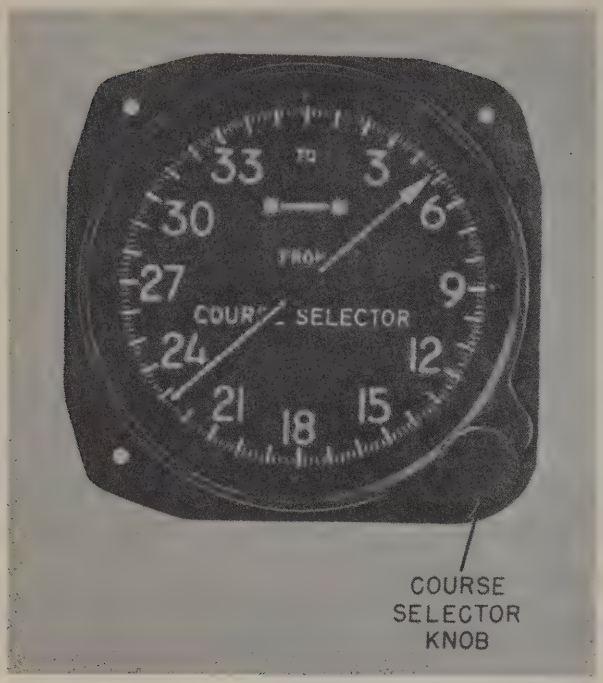


Figure 1-5. Course Indicator ID-322/ARN-30

changeability of some of the major units, a comparison of the units of each set is given in table 1-7. Interconnecting parts supplied with each set are not considered in this table.

Figure 1-6. Course Indicator ID-453/ARN-30

1-21. TEST POINT IDENTIFICATION SYMBOLS.

1-22. Test point identification symbols, which appear on schematic diagrams and are referenced within the text, are explained in paragraphs 5-1 through 5-5.

TABLE 1-7. COMPARISON OF RADIO RECEIVING SET AN/ARN-30, AN/ARN-30A, AN/ARN-30B, AND AN/ARN-30C

RADIO RECEIVING SET AN/ARN-30		RADIO RECEIVING SET AN/ARN-30A		RADIO RECEIVING SET AN/ARN-30B		RADIO RECEIVING SET AN/ARN-30C		*INTER-CHANGE-ABLE*
AN Nomen-clature	*ARC Type Designation*	*AN Nomen-clature*	*ARC Type Designation*	*AN Nomen-clature*	*ARC Type Designation*	*AN Nomen-clature*	*ARC Type Designation*	
Antenna AS-580/ARN-30 or Antenna AS-580A/ARN-30	Antenna ARC Type A-13A or Antenna ARC Type A-13B	Antenna AS-580A/ARN-30	Antenna ARC Type A-13B	Antenna AS-580A/ARN-30	Antenna ARC Type A-13B	Antenna AS-580A/ARN-30	Antenna ARC Type A-13B	Yes
Radio Receiver R-445/ARN-30	Radio Receiver ARC Type R-13B	Radio Receiver R-445/ARN-30	Radio Receiver ARC Type R-13B	Radio Receiver R-445/ARN-30	Radio Receiver ARC Type R-13B	Radio Receiver R-445/ARN-30	Radio Receiver ARC Type R-13B	Yes
Signal Data Converter CV-217/ARN-30	Converter ARC Type B-10A	Signal Data Converter CV-265/ARN-30A	Converter ARC Type B-13	Signal Data Converter CV-265A/ARN-30A	Converter ARC Type B-13A	Signal Data Converter CV-265A/ARN-30A	Converter ARC Type B-13A	No
Mounting MT-1047/ARN-30	Rack ARC Type E-13B	Mounting MT-1175/ARN-30A	Rack ARC Type E-14	Mounting MT-1175/ARN-30A	Rack ARC Type E-14	Mounting MT-1175/ARN-30A	Rack ARC Type E-14	No
Mounting MT-1044/ARN-30	Mounting ARC Type M-22	Mounting MT-1174/ARN-30A	Mounting ARC Type M-10	Mounting MT-1174/ARN-30A	Mounting ARC Type M-10	Mounting MT-1174/ARN-30A	Mounting ARC Type M-10	No
Filter-Amplifier AM-609/ARN-30	Filter-Amplifier ARC Type F-10A	No comparative component; however function included in Signal Data Converter CV-265/ARN-30A and CV-265A/ARN-30A						—
Mounting MT-1045/ARN-30	Mounting ARC Type M-21	Not Required						—
Dynamotor DY-86/ARN-30	Dynamotor ARC Type D-10A	Dynamotor DY-86/ARN-30	Dynamotor ARC Type D-10A	Dynamotor DY-86/ARN-30	Dynamotor ARC Type D-10A	Dynamotor DY-86/ARN-30	Dynamotor ARC Type D-10A	Yes

TABLE 1-7. COMPARISON OF RADIO RECEIVING SET AN/ARN-30, AN/ARN-30A, AN/ARN-30B, AND AN/ARN-30C (Cont)

RADIO RECEIVING SET AN/ARN-30		RADIO RECEIVING SET AN/ARN-30A		RADIO RECEIVING SET AN/ARN-30B		RADIO RECEIVING SET AN/ARN-30C		*INTER-CHANGE-ABLE*
AN Nomen-clature	*ARC Type Designation*	*AN Nomen-clature*	*ARC Type Designation*	*AN Nomen-clature*	*ARC Type Designation*	*AN Nomen-clature*	*ARC Type Designation*	
Radio Set Control C-984/ARN-30	Control Unit ARC Type C-22A	Radio Set Control C-984/ARN-30 or *Radio Set Control C-1254/ARN-30	Control Unit ARC Type C-22A or *Control Unit ARC Type C-1254	Radio Set Control C-1254/ARN-30	Control Unit ARC Type C-1254	Radio Set Control C-1254/ARN-30	Control Unit ARC Type C-1254	See Note 2, Table 1-1
Mounting MT-1046/ARN-30	Mounting ARC Type M-18	Mounting MT-1046/ARN-30	Mounting ARC Type M-18	Mounting MT-1046/ARN-30	Mounting ARC Type M-18	Mounting MT-1046/ARN-30	Mounting ARC Type M-18	Yes
Indicator ID-48/ARN	Cross-Pointer Meter ARC-13310	Indicator ID-48/ARN	Cross-Pointer Meter ARC-13310	Indicator ID-48/ARN	Cross-Pointer Meter ARC-13310	Not Required		Yes
Course Indicator ID-322/ARN-30	Course Selector/ To-From Meter ARC-15463	Course Indicator ID-322/ARN-30	Course Selector/ To-From Meter ARC-15463	Course Indicator ID-322/ARN-30	Course Selector/ To-From Meter ARC-15463	Not Required		Yes
—	—	—	—	—	—	Course Indicator ID-453/ARN-30	Indicator ARC Type IN-10	—
—	—	Mounting MT-1508/ARN-30A	Rack ARC Type E-15	Mounting MT-1508/ARN-30A	Rack ARC Type E-15	Mounting MT-1508/ARN-30A	Rack ARC Type E-15	Yes
—	—	Mounting MT-1509/ARN-30A	Rack ARC Type E-16	Mounting MT-1509/ARN-30A	Rack ARC Type E-16	Mounting MT-1509/ARN-30A	Rack ARC Type E-16	Yes
—	—	Mounting MT-1510/ARN-30A	Mounting ARC Type M-25	Mounting MT-1510/ARN-30A	Mounting ARC Type M-25	Mounting MT-1510/ARN-30A	Mounting ARC Type M-25	Yes

* Radio Set Control C-1254/ARN-30 replaces Radio Set Control C-984/ARN-30 electrically but not physically. Radio Set Control C-984/ARN-30 requires Mounting MT-1046/ARN-30.

SECTION II

TEST EQUIPMENT AND TOOLS

2-1. LIST OF TEST EQUIPMENT.

2-2. The test equipment required for maintenance of the set is listed in table 2-1.

TABLE 2-1. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

Name	*AN Type Designation*	*Alternate*	*Use*
Audio Oscillator	TS-382A/U	Hewlett-Packard Model 200C	Modulation signal source
Bench Test Kit	ARC Type 15D	Bench Test Kit ARC Type 15C with Converter Test Harness ARC-15913 and Cable Harness Assembly ARC-16103	Alinement and test procedures
Electronic Multimeter	ME-6B/U	Ballantine Model 300	AC voltage measurements
Headset	HS-33	Equivalent impedance headset	Aural testing
Milliammeter	TS-11/AP	Equivalent milliammeter with 0-25 ma range	Cathode current measurements
Multimeter	TS-297/U	Simpson Model 443 Weston Model 663	Voltage, current, and resistance measurements at 1000 ohms-per-volt
Multimeter	TS-352/U	Navy OE Weston Model 790 Simpson Model 260	Voltage, current, and resistance measurements at 20,000 ohms-per-volt
Output Meter	Weston 687 Simpson 427	TS-297/U with suitable capacitor coupling	Output measurements
Signal Generator	SG-66/ARM-5*	MD-83/ARN SG-1/ARN	Alinement and test procedures
Signal Generator	TS-413/U	AN/URM-25 TS-497/URR	Alinement and test procedures
Tube Tester	Signal Corps Type I-177A	Hickock 540 Hickock 547	Electron tube testing
Radio Receiving Set	AN/ARN-30A, AN/ARN-30B, or AN/ARN-30C	—	"Standardized", for component substitution tests
DC Voltmeter	I-50	PX-14	Primary power voltage measurements
0-1 Milliammeter	—	—	Measures signal strength

*Part of Radio Test Set AN/ARM-5.

TABLE 2-2. SPECIAL TOOLS REQUIRED FOR MAINTENANCE

Fig. No.	*Part No.*	*Name*	*Application*
2-1	ARC-10307	Alinement Tool	Alinement of r-f circuits of Radio Receiver R-445/ARN-30
2-2	ARC-A-7660A or ARC Type W-10	Mechanical Linkage Tool	Assembly of Mechanical Linkage ARC-6151 or MC-215(ARC-16158); refer to paragraphs 3-8 through 3-10

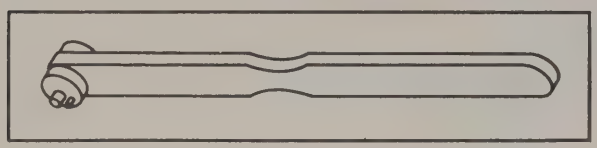


Figure 2-1. Alinement Tool ARC-10307

2-3. LIST OF SPECIAL TOOLS.

2-4. The special tools required for maintenance of the sets are listed in table 2-2.

2-5. CABLE FABRICATION FOR BENCH TEST SET-UPS.

2-6. Cable assemblies required for bench test set-ups are the same as those used for interconnecting the units for normal operation; however, only the connectors and mechanical linkage detail parts are supplied. (Refer to table 1-2.) See figure 3-1 for cable fabrication instructions, and refer to paragraphs 3-8 through 3-10 for mechanical linkage assembly instructions. Where Bench Test Kit ARC Type 15D is employed, the necessary interconnecting cable assembly is furnished in a fabricated form.

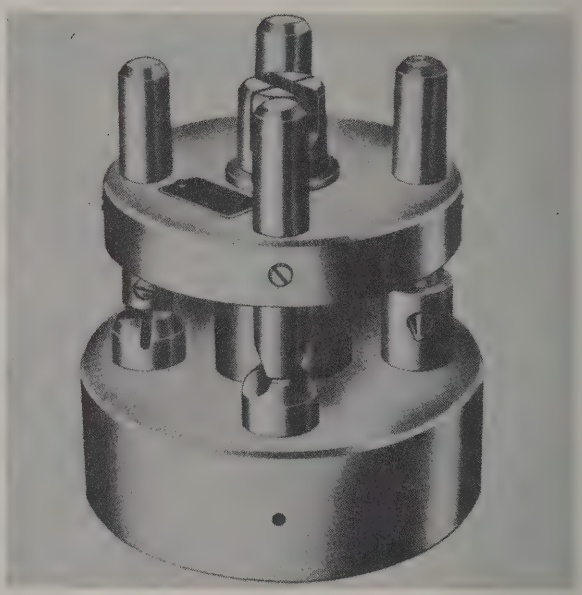


Figure 2-2. Mechanical Linkage Tool

SECTION III

PREPARATION FOR USE AND RESHIPMENT

3-1. UNCRATING THE EQUIPMENT.

3-2. The equipment units are packed in cartons, and shipped in a steel-strapped crate. To unpack the equipment, proceed as follows:

a. Clip the two metal bands that encircle the shipping carton. Slit the gummed tape on the side indicated.

b. Remove the cardboard blocks surrounding the antenna, and carefully lift out the antenna taking care not to damage the antenna rods.

c. Remove the filler packing material surrounding the cartons; lift out the cartons.

d. Carefully slit the gummed tape on the top ends of the cartons, remove any packing material, and pull the units out from the cartons; do not turn on end and "shake out".

e. Check the unpacked equipment against the packing list and the equipment supplied list (tables 1-1 and 1-2).

3-3. PREPARING THE EQUIPMENT FOR USE.

3-4. Except for the fabrication of the interconnecting cable assemblies and mechanical linkage, no special procedures are required to prepare the units for use. However, before installing the equipment, inspect its units for possible damage incurred during shipment as follows:

a. Remove the tube-access covers from the receiver and Signal Data Converter CV-265/ARN-30A. Remove the top cover from Signal Data Converter CV-265A/ARN-30A. Visually inspect the physical condition of the electron tubes and other readily visible parts. Replace the covers.

b. Remove the gray screw-on cap in the center of the panel, from the front panel of the receiver. Check that a wired-plug (this plug has a paper tag attached) is installed. Replace the cap.

CAUTION

Unless a vhf transmitter such as Radio Transmitter T-366A/ARC or T-363A/ARC, or a 75-mc marker beacon receiver such as Marker Beacon Receiver ARC Type R-20A, is to be powered by the dynamotor on the R-445/ARN-30, this plug must be installed to ensure operation of the entire set; it completes the equipment high-voltage circuit.

c. Visually inspect the ID-48/ARN, ID-322/ARN-30 and the ID-453/ARN-30 instruments, checking for possible broken or cracked glass. Rotate the COURSE SELECTOR knob and check the resulting rotation of the pointer. Lightly tap the ID-48/ARN and ID-453/ARN-30, and check the meter damping.

3-5. Fabricate the necessary interconnecting cables and mechanical linkage. Refer to paragraphs 3-6 through 3-10.

3-6. CABLE FABRICATION.

3-7. No cable assemblies are supplied with the equipment; however, all the necessary parts, except open-wiring, are supplied. Cable connector assembly instructions are outlined and illustrated in figure 3-1. The actual length of the cable assemblies used will depend on the location of the equipment in the aircraft in which they are installed. For the connections of the individual conductors in the harness, see the external wiring diagram. (See figure 7-19 or 7-20.)

3-8. MECHANICAL LINKAGE FABRICATION.

3-9. GENERAL. Depending on the parts supplied, either of two available special tools is required to fabricate the remote-tuning mechanical linkage. To assemble the parts comprising Mechanical Linkage ARC-6151, Tool ARC-A-7660A is used; to assemble Mechanical Linkage MC-215(ARC-16158), Tool ARC Type W-10 is used. Though the two mechanical linkage assemblies are functionally identical, and are interchangeable in use, some of the individual parts are not interchangeable. A comparison of the individual part numbers is given in table 3-1.

TABLE 3-1. COMPARISON OF MECHANICAL LINKAGE PARTS

Part Name	*Mechanical Linkage ARC-6151 (use Tool ARC-A-7660A for assembly)*	*Mechanical Linkage MC-215(ARC-16158) (use Tool ARC Type W-10 for assembly)*
*Shafting	ARC-1174	ARC-1174
Casing	ARC-3406	ARC-8601
*Spline	ARC-6788	ARC-6788
Sleeve	ARC-6585	ARC-11036
Nut	ARC-1167	ARC-11035
Tag	—	ARC-16163

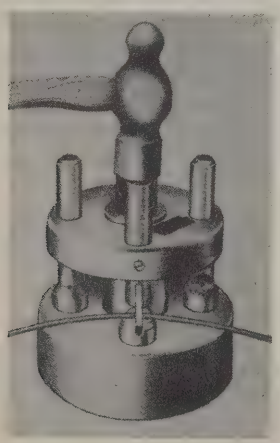
*These parts are interchangeable.

3-10. ASSEMBLING MECHANICAL LINKAGE. Operation of either of the special tools required for assembling the mechanical linkage is the same. The overall length of the assembled mechanical linkage will depend on the requirements of the aircraft in which the equipment is installed. To assemble the parts of Mechanical Linkage ARC-6151 (figure 3-2) using Tool ARC-A-7660A; or Mechanical Linkage MC-215(ARC-16158) (figure 3-2) using Tool ARC Type W-10, proceed as follows:

a. Determine the length of shafting (1, figure 3-2) required.

b. Using a 1-1/2- to 2-pound hammer, insert the shafting in the swage shafting position of the assembly tool, and with the shafting centered at the proposed cut-off point, swage the shafting for approximately 1-1/2 inches. Use a hammer-blow force only sufficient to drive the two halves of the tool together. If necessary, repeat the hammer blows to swage shafting properly.

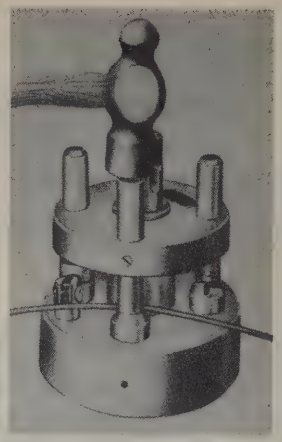
c. Set the swaged portion of the shafting in the cut shafting position of the tool, and using a hammer blow *only heavy enough to effect the cut-off,* cut the shafting at the cut-off point.



Cutting Shafting

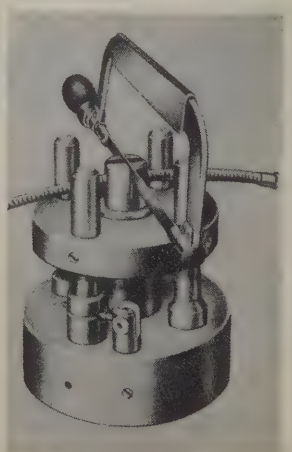
d. Grasping short sections of a 1-1/2-foot portion of the casing (2, figure 3-2) to be used in the assembly, push the spiral joints together. (Movement of the spirals may not be apparent.)

e. Mark off *exactly* one foot on the "collapsed" section. Grasp each end of this marked-off portion,

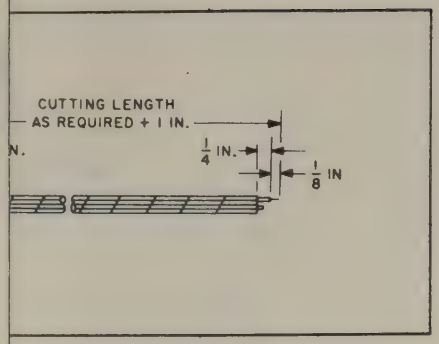


Swaging Shafting

and exerting an approximate 50-pound pull, stretch the casing in an outward direction. Measure the increase in length between marks. Next stretch more casing than will be used and saw the *stretched-out* casing longer than the shafting length (step c. of this paragraph) by one half the increase measured in this step for each foot of shaft length. For example: A 10-foot length of shafting is required (step a. of this paragraph), is swaged (step b.), and is cut (step c.). The one-foot length of casing, when stretched, measures 12-1/2 inches, an increase of 1/2 inch. For each foot of shafting, 1/4 inch is added making a total of 10 feet, 2-1/2 inches. The *stretched-out* casing is then cut to a length of 10 feet, 2-1/2 inches. This method of determining casing length is made necessary by varying amounts of "accordion" action in the different manufacturing lots.



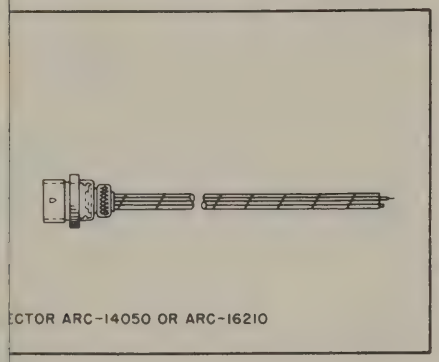
Sawing Shafting



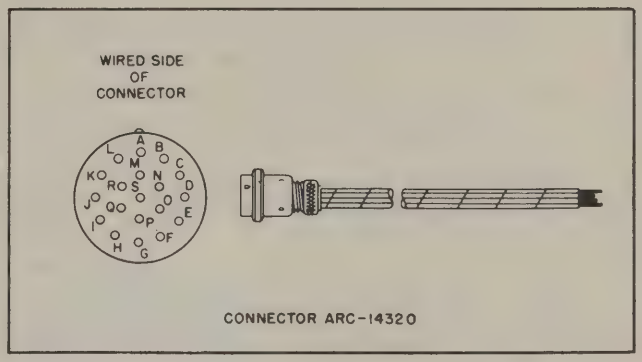
ASSEMBLY PROCEDURE:

1. STRIP WIRE ENDS TO DIMENSIONS INDICATED
2. TIN ENDS OF CONDUCTORS
3. INSERT CABLE THROUGH THE CONNECTOR FROM THE REAR
4. SOLDER WIRES TO RESPECTIVE TERMINALS PER APPLICABLE WIRING DIAGRAM
5. ASSEMBLE INSULATOR ASSEMBLY INTO THE SHELL WITH THE RING. ADJUST POSITION OF END OF CABLE AS INDICATED

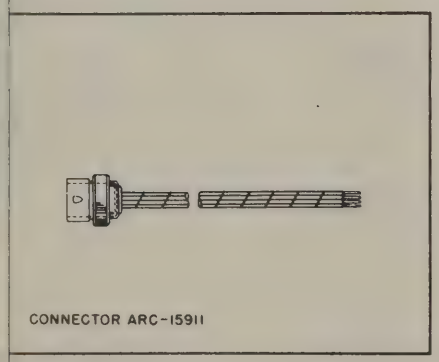
NOTE:
FOR LEAD OF THE CONDUCTORS IN THE HARNESS SEE APPLICABLE WIRING DIAGRAM



CTOR ARC-14050 OR ARC-16210



CONNECTOR ARC-14320



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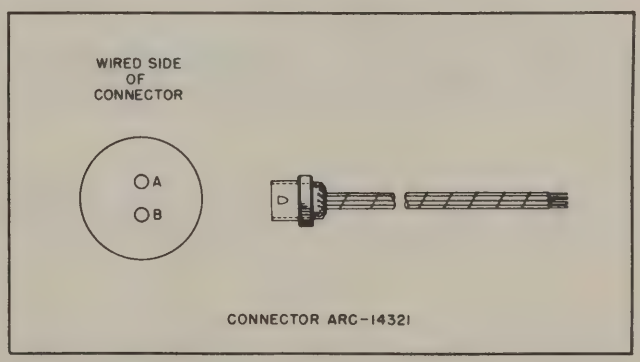
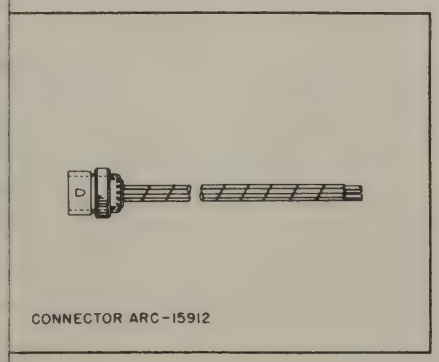
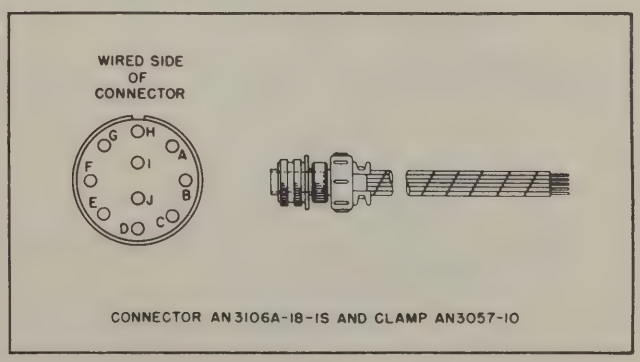


CONNECTOR ARC-14321



CONNECTOR ARC-15912



CONNECTOR AN3106A-18-1S AND CLAMP AN3057-10

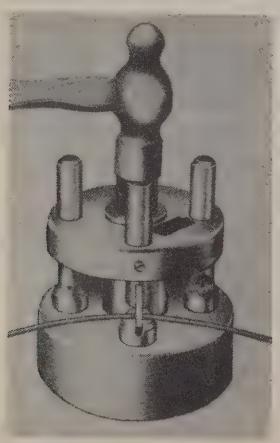
Figure 3-1. Cable Assemblies, Fabrication Diagram

3-10. ASSEMBLING MECHANICAL LINKAGE. Operation of either of the special tools required for assembling the mechanical linkage is the same. The overall length of the assembled mechanical linkage will depend on the requirements of the aircraft in which the equipment is installed. To assemble the parts of Mechanical Linkage ARC-6151 (figure 3-2) using Tool ARC-A-7660A; or Mechanical Linkage MC-215(ARC-16158) (figure 3-2) using Tool ARC Type W-10, proceed as follows:

a. Determine the length of shafting (1, figure 3-2) required.

b. Using a 1-1/2- to 2-pound hammer, insert the shafting in the swage shafting position of the assembly tool, and with the shafting centered at the proposed cut-off point, swage the shafting for approximately 1-1/2 inches. Use a hammer-blow force only sufficient to drive the two halves of the tool together. If necessary, repeat the hammer blows to swage shafting properly.

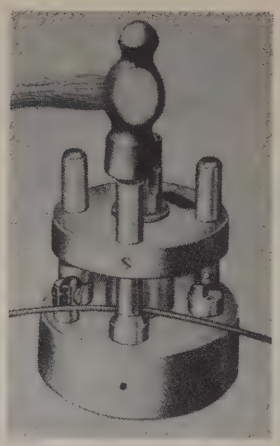
c. Set the swaged portion of the shafting in the cut shafting position of the tool, and using a hammer blow *only heavy enough to effect the cut-off,* cut the shafting at the cut-off point.



Cutting Shafting

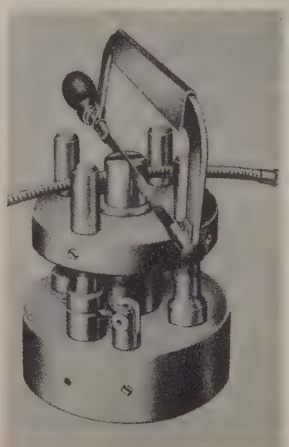
d. Grasping short sections of a 1-1/2-foot portion of the casing (2, figure 3-2) to be used in the assembly, push the spiral joints together. (Movement of the spirals may not be apparent.)

e. Mark off *exactly* one foot on the "collapsed" section. Grasp each end of this marked-off portion,

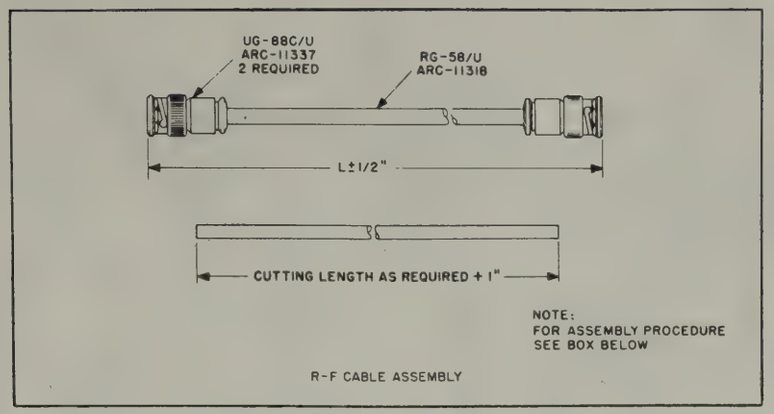


Swaging Shafting

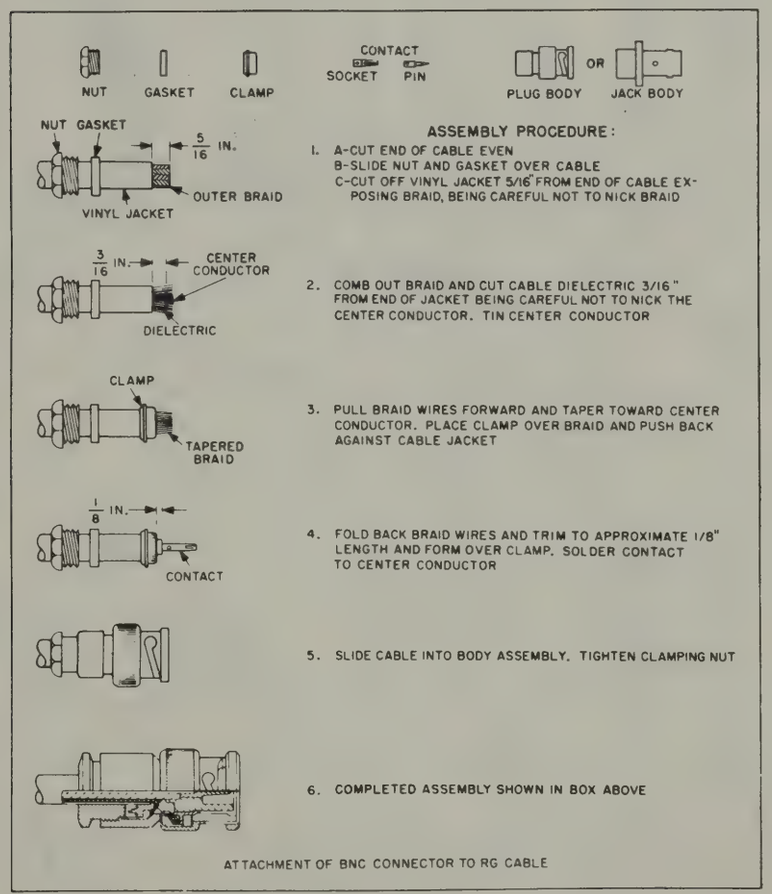
and exerting an approximate 50-pound pull, stretch the casing in an outward direction. Measure the increase in length between marks. Next stretch more casing than will be used and saw the *stretched-out* casing longer than the shafting length (step c. of this paragraph) by one half the increase measured in this step for each foot of shaft length. For example: A 10-foot length of shafting is required (step a. of this paragraph), is swaged (step b.), and is cut (step c.). The one-foot length of casing, when stretched, measures 12-1/2 inches, an increase of 1/2 inch. For each foot of shafting, 1/4 inch is added making a total of 10 feet, 2-1/2 inches. The *stretched-out* casing is then cut to a length of 10 feet, 2-1/2 inches. This method of determining casing length is made necessary by varying amounts of "accordion" action in the different manufacturing lots.



Sawing Shafting



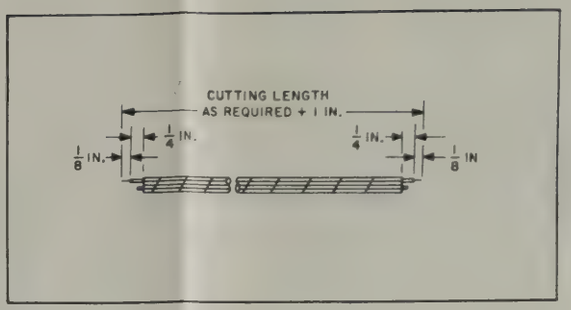
R-F CABLE ASSEMBLY



ASSEMBLY PROCEDURE:

1. A-CUT END OF CABLE EVEN
   B-SLIDE NUT AND GASKET OVER CABLE
   C-CUT OFF VINYL JACKET 5/16" FROM END OF CABLE EXPOSING BRAID, BEING CAREFUL NOT TO NICK BRAID
2. COMB OUT BRAID AND CUT CABLE DIELECTRIC 3/16" FROM END OF JACKET BEING CAREFUL NOT TO NICK THE CENTER CONDUCTOR. TIN CENTER CONDUCTOR
3. PULL BRAID WIRES FORWARD AND TAPER TOWARD CENTER CONDUCTOR. PLACE CLAMP OVER BRAID AND PUSH BACK AGAINST CABLE JACKET
4. FOLD BACK BRAID WIRES AND TRIM TO APPROXIMATE 1/8" LENGTH AND FORM OVER CLAMP. SOLDER CONTACT TO CENTER CONDUCTOR
5. SLIDE CABLE INTO BODY ASSEMBLY. TIGHTEN CLAMPING NUT
6. COMPLETED ASSEMBLY SHOWN IN BOX ABOVE

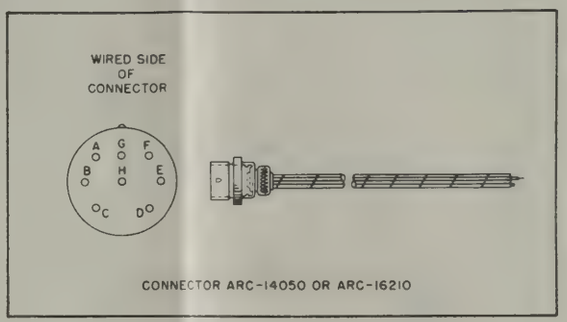
ATTACHMENT OF BNC CONNECTOR TO RG CABLE



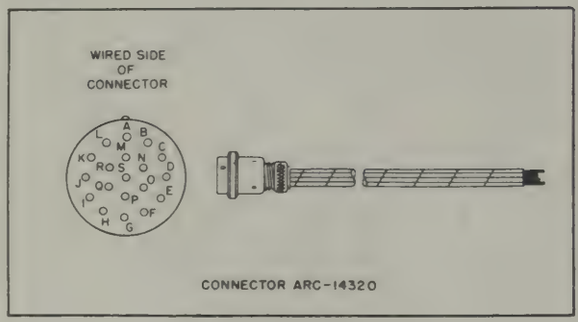
ASSEMBLY PROCEDURE

1. STRIP WIRE ENDS TO DIMENSIONS INDICATED
2. TIN ENDS OF CONDUCTORS
3. INSERT CABLE THROUGH THE CONNECTOR FROM THE REAR
4. SOLDER WIRES TO RESPECTIVE TERMINALS PER APPLICABLE WIRING DIAGRAM
5. ASSEMBLE INSULATOR ASSEMBLY INTO THE SHELL WITH THE RING. ADJUST POSITION OF END OF CABLE AS INDICATED

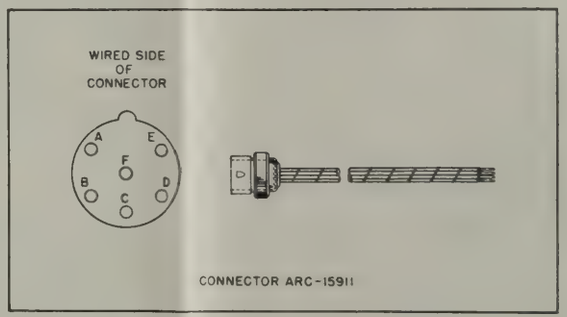
NOTE:
FOR LEAD OF THE CONDUCTORS IN THE HARNESS SEE APPLICABLE WIRING DIAGRAM



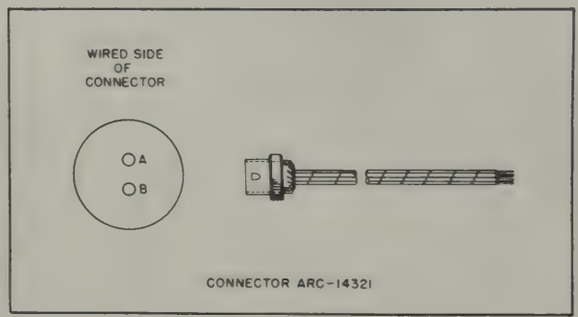
CONNECTOR ARC-14050 OR ARC-16210



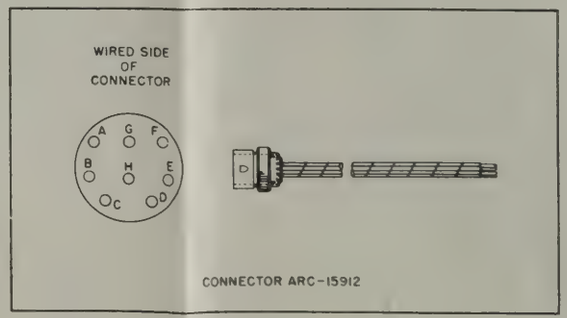
CONNECTOR ARC-14320



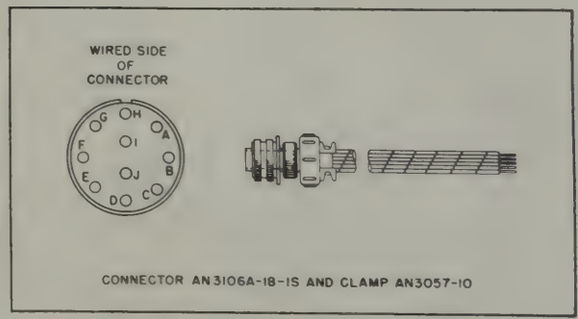
CONNECTOR ARC-15911



CONNECTOR ARC-14321



CONNECTOR ARC-15912



CONNECTOR AN3106A-18-1S AND CLAMP AN3057-10

Figure 3-1. Cable Assemblies, Fabrication Diagram

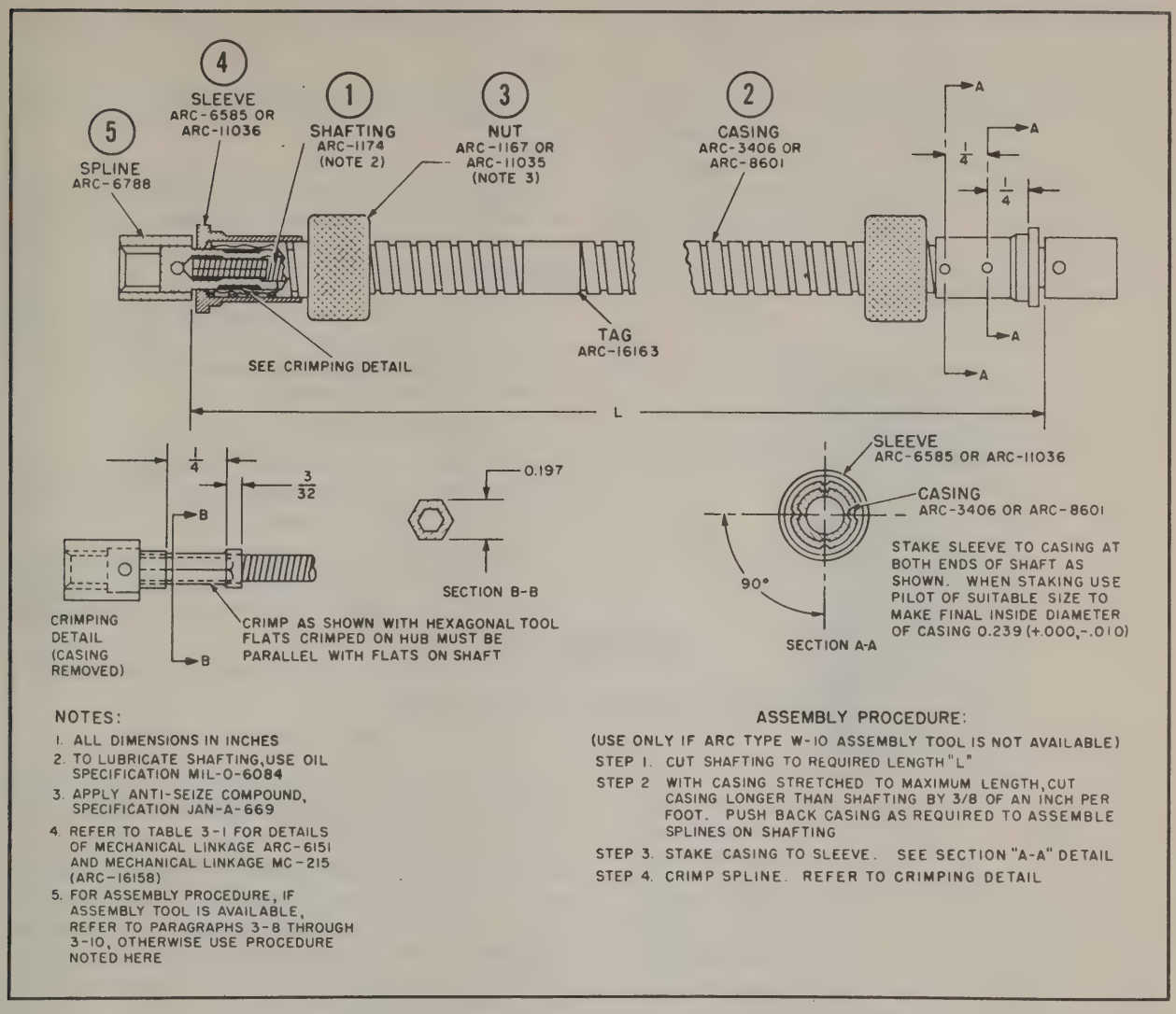


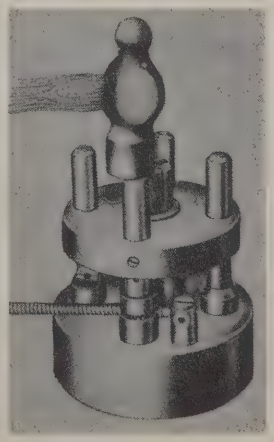
Figure 3-2. Mechanical Linkage Assembly Diagram

f. Using side cutters and a file, trim the burrs from the end of the casing.

g. Place a nut (3, figure 3-2) over the casing with the threaded-end toward the end of the casing.

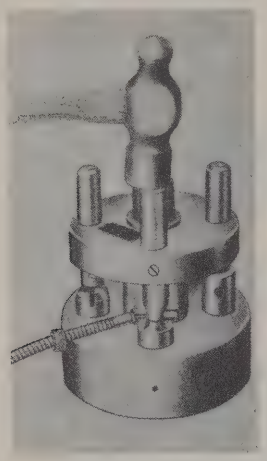
h. Place the sleeve (4) over the end of the casing, inserting the casing into the sleeve as far as possible; make sure the casing butts against the inner end of the sleeve. Push the sleeve and casing onto the guide pin of the tool until the end of the sleeve is against the tool post. Swing the sleeve and pin into the stake casing position and strike a hammer blow only hard enough to drive the two halves of the tool together. Rotate the casing 90 degrees and stake the sleeve to the casing again. Stake the two remaining 90-degree positions.

i. Repeat step h. at the other end of the casing.



Staking Casing

j. Push the spline (5) over the swaged end of the shafting as far as it will go. Center the hub of the spline, with shafting inserted, in the crimp spline position on the tool and crimp the spline to the shafting, using a fairly sharp hammer blow. Strike the tool only hard enough to drive the two halves of the tool together. If necessary, repeat the hammer blow for proper crimping. Make certain that flats crimped on shafting are parallel to flats on the tool.



Crimping Spline

k. Lubricate the shafting lightly with oil, Specification MIL-O-6084. Insert the shafting into the casing. Push back the casing as required to expose the swaged end of the shafting. Use a thin wrapping of tape to prevent the shafting from sliding back into the casing. Repeat step j. of this paragraph to complete the mechanical linkage.

l. Lubricate the threads of the nuts with anti-seize compound, Specification JAN-A-669.

3-11. INSTALLING THE EQUIPMENT.

3-12. GENERAL. The location and installation of the equipment will depend on the aircraft in which the equipment is to be installed. Refer to the applicable aircraft's Maintenance Handbook for specific instructions. Observe the following points during installation.

a. The supplied indicator or indicators must be shock-mounted in the aircraft instrument panel. The control unit must be installed nearby.

b. The coaxial cable from the antenna to the receiver must be as short as possible. (Refer to paragraph 3-13.)

c. Units must be located so that they will be horizontal within ± 20 degrees when the aircraft is in level flight.

d. Allow at least a two-inch clearance on all sides of each unit for sway and ventilation, and sufficient space in front of each unit to permit easy removal from its mounting.

e. Leave sufficient space behind the receiver and converter mountings to permit cable connections to be made. Also, arrange and size the cabling so as not to restrict shock-mount travel.

f. Do not make sharp bends in any cable.

g. Do not run cables where they may be subjected to excessively high temperature, such as may exist adjacent to heaters or engine exhausts.

h. Install the receiver reasonably close to the control unit so that the mechanical linkage between the units is as short as possible. There must be no sharp bends in the mechanical linkage.

i. Leave enough slack in cables to prevent vibration strain.

j. Anchor all cables securely.

k. For proper grounding of the set, clean the aircraft surface at all points to which the receiver and converter shock mounts are fixed.

3-13. ANTENNA INSTALLATION. The location and installation of the antenna will depend on the aircraft in which the equipment is installed. Note the following installation recommendations, since the final position of the antenna can affect the over-all perform ance of the equipment.

a. Locate the antenna if possible at a point where a clear line-of-sight area is available.

b. If possible keep the antenna symmetrical with the center line of the aircraft.

c. Install the antenna with the glide-path antenna section facing forward.

d. Mount the antenna as far as possible from other antennas on the aircraft. Avoid running lead-in antenna wires, or guy wires to *one side* of the antenna; installations where symmetry is maintained with respect to both sides of the antenna will cause the least amount of interaction.

3-14. CABLING BETWEEN UNITS. After the units have been mounted in the aircraft, install the harness and the r-f cables that have been prepared in accordance with the cable fabrication instructions (figure 3-1) and the external wiring diagram (figure 7-19 or 7-20.)

3-15. ADJUSTMENTS AFTER INSTALLATION.

3-16. ADJUSTING CONTROL UNIT TUNING DIAL. To adjust the tuning dial of the control unit so as to correlate its frequency reading and the tuning of the receiver, proceed as follows:

a. Connect a length of Mechanical Linkage ARC-6151 or MC-215(ARC-16158) between the receiver and control unit without regard to dial position or receiver tuning.

b. Turn the control unit tuning crank counterclockwise as far as it will go.

CAUTION

Do not force beyond stop point.

c. Remove the mechanical linkage either at the control unit or receiver.

d. Turn the tuning crank until the small dot on the dial, about 1-/8-inch to the right of the 135-mc line, comes directly under the triangular-shaped fiducial mark.

e. Replace the mechanical linkage, being careful not to change the relative position of the linkage or the spline to which it is attached.

f. Test the accuracy of dial-positioning by tuning in several stations of known frequency.

3-17. PREPARING THE EQUIPMENT FOR SHIPMENT OR STORAGE.

3-18. No special procedures are required for disassembling and packaging the equipment for shipment or storage. (Refer to paragraph 3-2.)

SECTION IV

THEORY OF OPERATION

4-1. GENERAL SYSTEM OPERATION.

4-2. PRIMARY POWER CIRCUIT. (See figures 4-1 and 4-2.) Primary power (28 volts dc) for a one-rack installation is brought in through Mounting MT-1175/ARN-30A to the control unit. The closing of the primary power switch in the control unit energizes relay K301 in the mounting. The relay distributes the low voltage to the receiver and the converter. Also, the low voltage is applied through the receiver to the dynamotor, which generates the high voltage operating potential. The high voltage is distributed to the receiver circuits, and through the mounting to the converter. Dc for the panel lamps of Radio Set Control C-1254/ARN-30 is applied through a separate lead from the aircraft 28-volt supply. In a two-rack installation, primary power is brought into the receiver rack Mounting MT-1508/ARN-30A and then to the control unit. The closing of the primary power circuit energizes relay K1801 in the receiver mounting and distributes the low voltage. The two installations function in the same manner, except that the two-rack installation requires harness and r-f cable connections between the receiver and converter racks for the flow of operating voltages and intelligence.

4-3. SIGNAL CIRCUIT. With the receiver tuned to an incoming signal by the control unit, the signal picked up by the antenna is fed by the coaxial cable to the input circuits of the receiver. The type of signal reception desired is selected by the OMNI-VAR LOC switch on the control unit. With this switch in the OMNI position, the high voltage, and the navigation portion of a VOR signal are fed to the normally closed contacts of relay K201 (in the converter) to the omni circuits of the converter. Here, the intelligence is converted into visual track information for presentation on Indicator ID-48/ARN or Course Indicator ID-453/ARN-30, depending on the set used. With the switch in the VAR LOC position, the low-voltage circuit is closed, actuating the two relays, K201 and K202. The closing of K201 applies high voltage and feeds the navigation portion of the VAR or localizer signal to the VAR and localizer circuits of the converter, which converts it for visual presentation on Indicator ID-48/ARN or Course Indicator ID-453/ARN-30. The closing of K202 feeds flag data from the VAR and localizer circuits to the flag circuits of Indicator ID-48/ARN. If the OMNI-VAR LOC switch is set incorrectly for the type of signal being received, the vertical-pointer flag-alarm will show. In either position of the selector switch, the audio portion of the received signal is routed to the control unit where its level may be adjusted, and where the output is made available at a lead brought out from the control unit connector. This lead is connected to a suitable monitoring point within the aircraft. A provision is also made to permit the use of a tuning meter if desired.

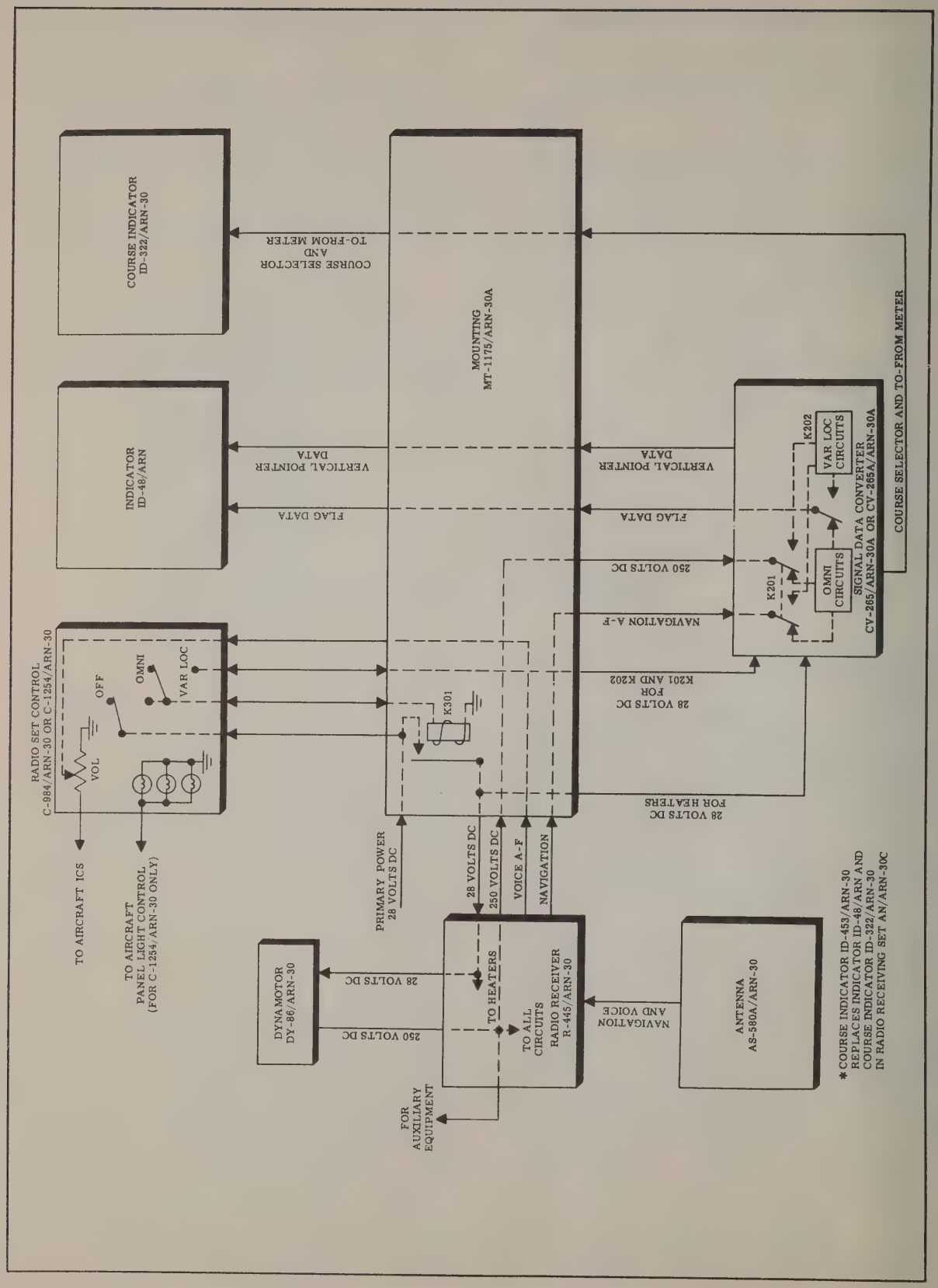


Figure 4-1. One-Rack Installation, Block Diagram

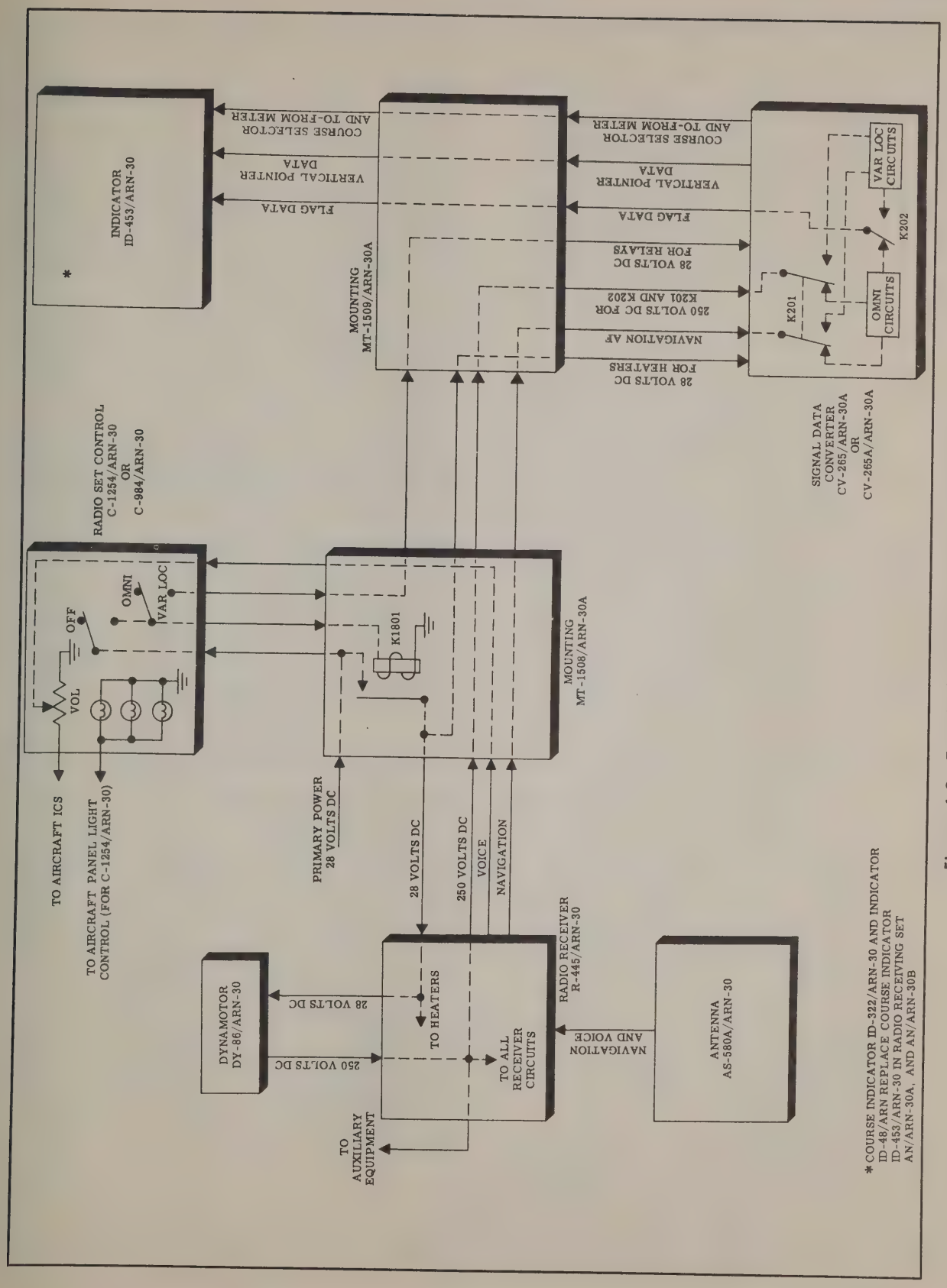


Figure 4-2. Two-Rack Installation, Block Diagram

4-4. FUNCTIONAL OPERATION OF ELECTRONIC UNITS.

4-5. ANTENNA AS-580A/ARN-30. Antenna AS-580A/ARN-30 is a "ramshorn" V-type incorporating two broad-band dipole antennas. The forward dipole antenna is for use with glide-slope receivers, when such equipment is installed in the aircraft. The angular, rear dipole antenna is used for VOR, VAR, and localizer signal reception. Both antennas terminate in individual UG-291/U connectors, located in the antenna base. The antennas are set in a rubber block which in turn is fastened to an aluminum support. The antenna is designed to be mounted in a forward position on the aircraft fuselage.

4-6. RADIO RECEIVER R-445/ARN-30.

4-7. GENERAL. (See figure 4-3.) Radio Receiver R-445/ARN-30 is a nine-tube superheterodyne, continuously tunable over a frequency range of 108 to 135 mc. The r-f section of the receiver is a preselector unit which contains four tuned circuits and four electron tubes arranged as follows: a tuned input circuit, a type 9003 first r-f amplifier and tuned output circuit, a 9003 second r-f amplifier and tuned output circuit, a 9003 mixer, and a 9002 r-f oscillator and tuned circuit. The r-f oscillator and r-f signal circuits are tuned by a four-section gang capacitor. The i-f section, at a frequency of 15 mc, consists of eight i-f tuned circuits, a type 14A7 first i-f amplifier, a 14R7 second i-f amplifier and avc, a 14R7 third i-f amplifier and avc, and a 14F7 detector and noise limiter, which also functions as the first audio amplifier. The audio output of the first audio amplifier is resistance-coupled to a type 12A6, functioning as the final audio amplifier. The output of the 12A6 is fed through an 8 to 1 step-down transformer to the telephone load. There are two audio output lines from the receiver. Navigational signals are taken from the cathode of the first a-f amplifier and fed to the converter. This output is unaffected by the headset load or setting of the volume control on the control unit. Voice and cw signals reach the headset from the second audio amplifier. The audio amplifier is designed to cut off signals at the low and high ends of the a-f spectrum, so that the audio signal to the load is down approximately 35 db from maximum at 30 cps, and 15 db at 10,000 cps.

4-8. R-F PRESELECTOR. R-f preselector Z101 consists of an antenna input circuit, a first and a second r-f amplifier, a local oscillator, and a mixer circuit. The details of these circuits are discussed in paragraphs 4-9 through 4-12.

4-9. ANTENNA INPUT CIRCUIT. (See figure 4-4.) The antenna input circuit is the first r-f tuned circuit. The signal from the antenna is transferred through an RG-58/U cable of 53 ohms nominal impedance through J101 to the untuned primary coil L102 and thence, by inductive coupling, to L101. Inductive coupling is chosen to reduce any undesired output from the r-f oscillator V104 appearing on the antenna. Gang trimmer capacitors C102B, C102D, C102F, and C102H are used to aline all tuned circuits, using a preselector alinement frequency of 131 mc. C103 is the grid coupling capacitor. Resistor R156 matches the impedance of the line to that of the antenna.

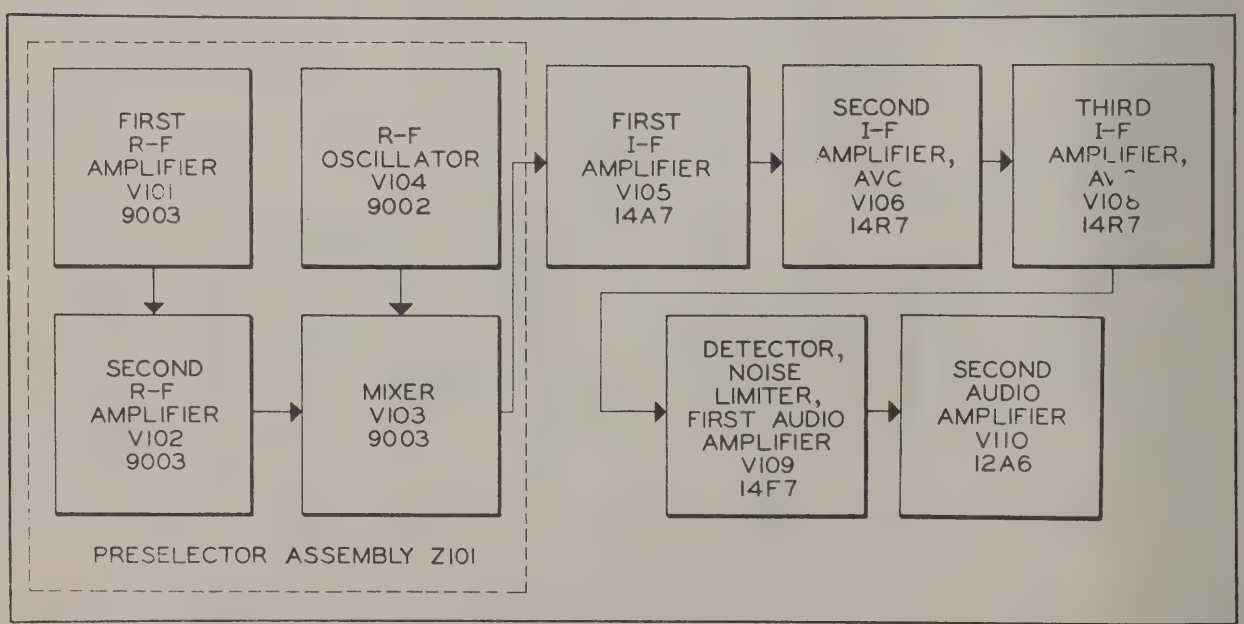
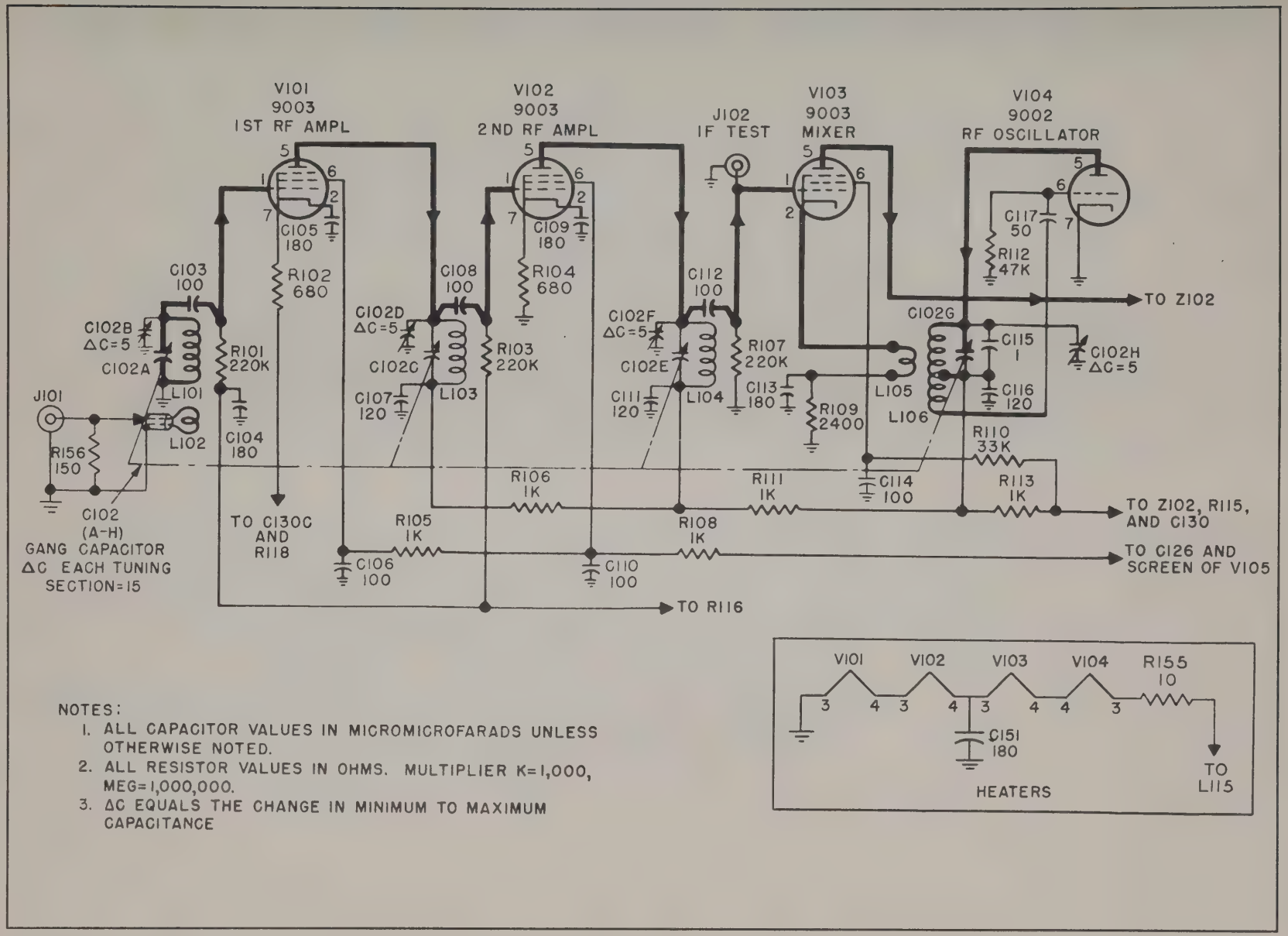

FIRST R-F AMPLIFIER V101 9003
R-F OSCILLATOR V104 9002
FIRST I-F AMPLIFIER V105 14A7
SECOND I-F AMPLIFIER, AVC V106 14R7
THIRD I-F AMPLIFIER, AVC V108 14R7
SECOND R-F AMPLIFIER V102 9003
MIXER V103 9003
DETECTOR, NOISE LIMITER, FIRST AUDIO AMPLIFIER V109 14F7
SECOND AUDIO AMPLIFIER V110 12A6
PRESELECTOR ASSEMBLY Z101

Figure 4-3. Radio Receiver R-445/ARN-30, Block Diagram



NOTES:

1. ALL CAPACITOR VALUES IN MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTOR VALUES IN OHMS. MULTIPLIER K=1,000, MEG=1,000,000.
3. ΔC EQUALS THE CHANGE IN MINIMUM TO MAXIMUM CAPACITANCE

Figure 4-4. R-f Oscillator and Mixer Circuits, Schematic Diagram

4-10. FIRST R-F AMPLIFIER CIRCUIT. (See figure 4-4.) The r-f signal is coupled to the grid of V101 through C103. R101 provides a d-c connection to the grid bias source. R102 is the cathode bias resistor and C105 is the r-f by-pass capacitor. C104 is the grid bias circuit decoupling by-pass capacitor. C107 together with R106 and C111 form a filter network to decouple the plate voltage circuit. C102D is the trimmer capacitor used to aline the output r-f tuned circuit (L103 and C102C) of V101. The output of this tuned circuit is coupled to the input grid of V102 through C108.

4-11. SECOND R-F AMPLIFIER CIRCUIT. (See figure 4-4.) The detail parts of the second r-f amplifier function in the same manner as those of the first r-f amplifier. (Refer to paragraph 4-10.) The output of the second r-f amplifier V102 is applied to the input grid of V103, the mixer.

4-12. R-F OSCILLATOR AND MIXER CIRCUITS. (See figure 4-4.) V104, a type 9002 electron tube, serves as the r-f oscillator in a tuned-plate oscillator circuit. By design the r-f oscillator frequency is below the signal frequency, the difference being equal to 15 mc (the intermediate frequency) throughout the tuning range of the receiver. C102G is the r-f oscillator tuning section of the ganged capacitor. C102H is used to aline the r-f oscillator tuned circuit (C102G and L106), using an r-f preselector alinement frequency of 131 mc. C117 and R112 are the grid capacitor and resistor. The r-f oscillator voltage is injected by way of the coupling coil L105 into the cathode of the mixer V103, a type 9003, so that the total r-f grid-to-cathode voltage of V103 is the sum of the signal voltage applied between the grid and ground and the oscillator voltage applied between cathode and ground. All tuned inductances of the preselector are factory-adjusted at the low-end alinement frequency (111 mc) by means of copper slugs mounted in the ends of the coil shields.

4-13. I-F AMPLIFIER CIRCUIT. (See figure 4-5.) All i-f amplifier circuits are similar in design and function, except for the fourth i-f coupling unit. The i-f amplifier section consists of eight tuned circuits arranged in four pairs. The primary of the first i-f tuned circuit Z102 is fed from the plate of the mixer V103 and consists of L107, fixed capacitor C120, and a trimmer capacitor C118. The secondary is simliarly designed. The remaining i-f tuned circuits (Z103, Z104, and Z105), except for the primary coil L116 and the primary and secondary fixed capacitors C152 and C154 of Z105, are identical. L116 is made larger and C152 is reduced in order to obtain sufficient undistorted i-f power for the avc rectifier. C154 is increased to make up for the lower input capacitance of V109. The inductances of each pair of tuned cricuits are magnetically coupled and designed to provide almost critical coupling. The output of the seventh i-f tuned circuit is connected to the avc diode of V108 and the output of the eighth i-f tuned circuit to the detector diode section of V109.

4-14. AUTOMATIC VOLUME CONTROL CIRCUIT. (See figure 4-5.) Automatic volume control is provided by a biasing circuit comprising the avc diode rectifier (terminal 3 to cathode) of V108 and the avc diode limiter (terminal 3 to cathode) of V106, a filter circuit consisting of R137, C144A, B, R124, C122A, B, R116, and C104, and a stabilized source of delayed bias voltage comprising R131, V107, R130 and R154. Since it is not advisable to apply the full value of avc bias to the input grid of V106, a voltage divider circuit consisting of R121 and R122 is included, which permits approximately 1/4 of the total avc bias to be applied to V106. The i-f voltage used to operate the diode rectifier of V108 is obtained from the primary of Z105 rather than the secondary, so that the output audio level is sharply tunable, even on a radio signal strong enough to operate the avc, by simply tuning for maximum audio output. If the avc rectifier were operated from the secondary of Z105, the tuning of a strong signal would be so broad, that an accurate aural setting would be nearly impossible; the better the avc the more nearly this would be true. The method actually used eliminates the need for a tuning meter or tuning eye when tuning in strong voice-modulated signals.

4-15. The avc circuit is designed to begin control when the radio input level at the antenna exceeds approximately 8 microvolts. The corresponding i-f level at the plate of V108 is 30 volts, and for 30 percent modulation of the r-f signal, the corresponding audio output level in a 300-ohm telephone load is approximately 200 milliwatts. The delayed avc action is obtained from the circuits associated with the avc diode rectifier (terminal 3 to cathode) of V108 and with the avc diode limiter (terminal 3 to cathode) of V106. The cathode of V108 is approximately 6 volts positive with respect to ground due to cathode current through R135. The cathode of V106 is approximately 2.5 volts positive with respect to ground because of the cathode current through R123. Thus, with no signal (and no rectification) present in the V108 diode circuit, a net d-c potential of approximately 3.5 volts operates to drive a direct current through R136 and R137 to diode terminal 3 of V106, thereby producing a negligibly small delay bias of approximately 0.5 volt on the V108 diode rectifier by the drop in R136. The delayed bias voltage source operates to provide additional d-c current through the V106 diode limiter as follows. Resistor R131 and neon lamp V107 fed from the +260-volt high-voltage source, serve to produce a stable d-c potential of approximately 80 volts at the junction of R131 and R130. As a result, an additional d-c current will flow through R130 and R131 to diode terminal 3 of V106, but with no effect on the no-signal potential of the avc bias line (diode limiter terminal 3). The d-c voltage drop through the low resistance of the limiter diode is negligible and so the d-c potential of the avc bias line to the grids of V101, V102, and V105 is held at the same potential as the cathode of V106.

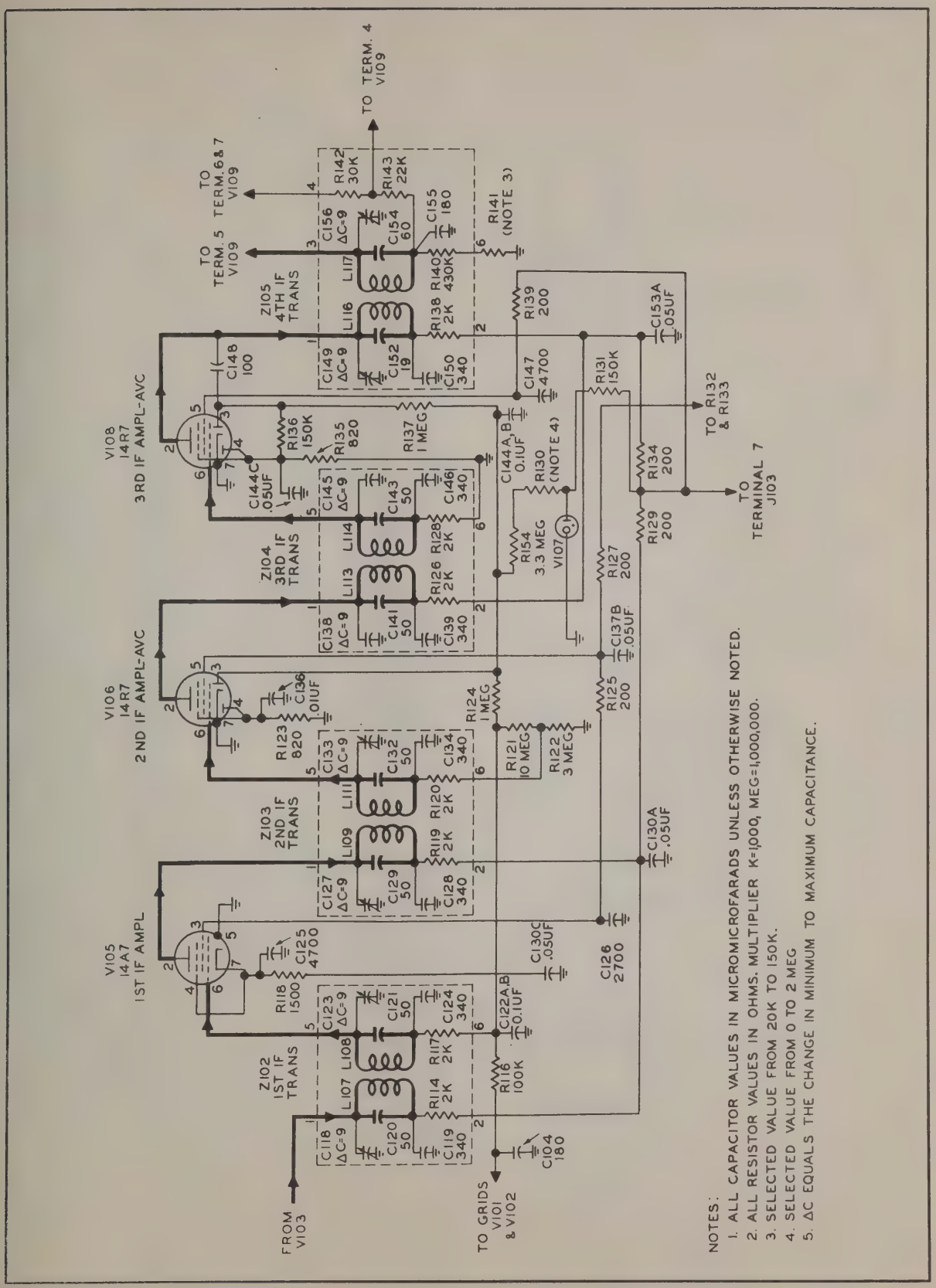

V105 14A7 1ST IF AMPL
V106 14R7 2ND IF AMPL-AVC
V108 14R7 3RD IF AMPL-AVC
Z102 1ST IF TRANS
Z103 2ND IF TRANS
Z104 3RD IF TRANS
Z105 4TH IF TRANS
FROM V103
TO GRIDS V101 & V102
TO TERM. 4 V109
TO TERM. 6 & 7 V109
TO TERM. 5 V109
TO R132 & R133
TO TERMINAL 7 J103
NOTES:
1. ALL CAPACITOR VALUES IN MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTOR VALUES IN OHMS. MULTIPLIER K=1,000, MEG=1,000,000.
3. SELECTED VALUE FROM 20K TO 150K.
4. SELECTED VALUE FROM 0 TO 2 MEG
5. ΔC EQUALS THE CHANGE IN MINIMUM TO MAXIMUM CAPACITANCE.

Figure 4-5. I-f Amplifier and AVC Circuits, Schematic Diagram

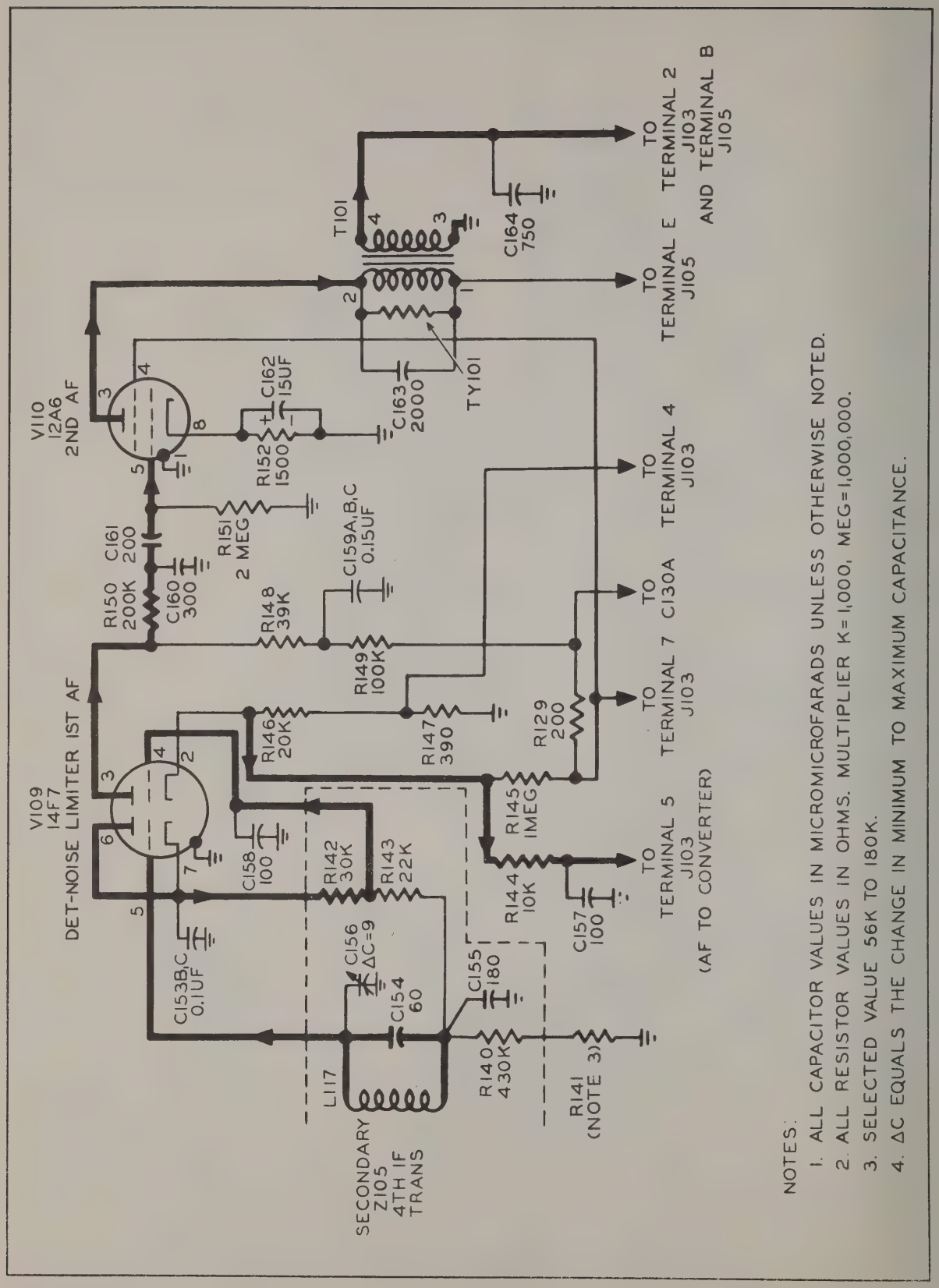


Figure 4-6. Detector, Noise Limiter and Audio Amplifier Circuits, Schematic Diagram

4-16. In order to cause the potential of the avc bias line to become more negative, and thereby just start avc action, the i-f signal level present must be of sufficient magnitude to cause the diode rectifier (terminal 3 of V108) to become so negative that all of the d-c current through R130 and R154 flows through R137, that is, none is left in the limiter diode circuit. Any further increase in i-f signal level will now cause the avc limiter diode to become negative with respect to the limiter cathode (terminal 7), thereby applying negative bias to the avc bias line.

4-17. DETECTOR, NOISE LIMITER, AND FIRST AUDIO CIRCUITS. (See figure 4-6.) The first triode section of V109 is connected as a diode (grid against cathode) to detect the i-f output from L117 of Z105 and develops a d-c voltage varying at an a-f rate across R142 and R143. The junction of R140 and C155 is kept at ground potential for dc only, by means of R140 and R141. The junction of R142 and C153B, C is kept at ground potential for a-f only, by C153B, C. Increasing the i-f amplitude on the detector makes the junction of R142 and C153B, C go positive with respect to ground for dc and, proportionately, to a lesser extent, does likewise for the junction of R142 and R143, whether modulation is or is not present. The d-c potential at the junction of R140 and C155 is not affected. If the intermediate frequency is modulated, the potential at the junction of R140 and C155 goes positive (at the valley of the modulation envelope) and negative (at the peaks of the modulation envelope) an equal amount. Therefore, the potential at the junction of R142 and R143 goes proportionately positive and negative, with respect to the positive d-c (average) potential established at this junction by the i-f carrier level. The potential at the junction of R142 and C153B, C is not affected by modulation.

4-18. The second triode section of V109 (terminals 2, 3 and 4) is biased just to cut-off by the d-c bleeder current from the +250-volt supply through R145, and the cathode bias resistors R146 and R147, with the grid (terminal 4) at ground potential for dc and no signal on the detector. An increasing i-f detector level will therefore place an increasing positive d-c potential on the grid (terminal 4), causing the triode (terminals 2, 3, and 4) to conduct, and plate current to flow. It can be seen therefore that this triode can amplify an audio signal impressed on terminal 4, provided the negative-going potential at the junction of R142 and R143 does not go instantaneously more negative than ground (the cut-off point). Because of this action, high peaks of the modulation envelope (noise peaks of short duration) will not appear in the plate circuit of the audio amplifier (terminal 3 to ground). R141 is a selected-value resistor chosen and installed at the time of final testing of the receiver, to standardize the phase shift at 30 cps of the a-f fed to the converter.

4-19. SECOND AUDIO AMPLIFIER. (See figure 4-6.) The a-f output from V109 is applied to the grid of V110, a type 12A6, for further amplification. The output of V110 is applied to T101, an 8-to-1 step-down output transformer; C163, across the primary of T101, acts as a filter capacitor to attenuate the audio frequencies above approximately 4000 cycles and also to prevent r-f and i-f from getting in or out of the receiver by way of the "TEL." line. This prevents interference from or with nearby receivers. TY101, a thyrite-type resistor, is also connected across the primary winding of T101. It acts as a surge voltage arrester to protect the equipment if exceptionally strong signals are received, when the normal telephone load is removed. Any increase in voltage across the resistor terminals causes a relatively large increase in current through the resistor and therefore tends to limit the voltage to approximately 120 volts ac across the primary of T101.

4-20. SIGNAL DATA CONVERTER CV-265/ARN-30A.

4-21. GENERAL. (See figure 4-7.) Signal Data Converter CV-265/ARN-30A is designed to accept the VOR (omni) information delivered by the receiver and convert and interpret it in such a way that the bearing of the receiving antenna from the transmitting antenna may be determined. It is also designed to accept the VAR and localizer information from the receiver and convert it to a form which is presented visually through the vertical pointer of Indicator ID-48/ARN or Course Indicator ID-453/ARN-30. Insofar as the VOR (omni) circuit of the converter is concerned, the navigational a-f signal from the receiver consists of two independent components. One is 30 cps and is known as the "variable channel" signal. Its phase in space at any given instant is a function of the bearing from the transmitter. The other is 10 kc (actually 9960 cycles) and is known as the "reference channel" signal. This signal is frequency-modulated at a 30-cps rate to 480 cps above and below 9960 cycles. After this signal passes through a filter, limiter, and discriminator, the 30-cps voltage is known as the "reference voltage". The phase of the reference channel is independent of the bearing from the transmitter. Omni-directional range transmission is such that for a signal received south (magnetic) of the VOR station, the 30-cps variable-channel amplitude modulation is in phase with the 30-cps frequency modulation of the 10-kc channel. When this signal is being received, the data presented by the instruments will be zero degrees TO or 180 degrees FROM the station. (All bearings are *magnetic* in omni.) At all points around the transmitter, the two 30-cps voltages differ in phase by an amount equal to the receiving antenna bearing *from* the transmitter. The function of the omni section of the converter, with the aid of Indicator ID-48/ARN and Course Indicator ID-322/ARN-30, or Course Indicator ID-453/ARN-30 is to measure this phase difference, which is then read on the course indicator as a bearing "TO" or "FROM" the omni station.

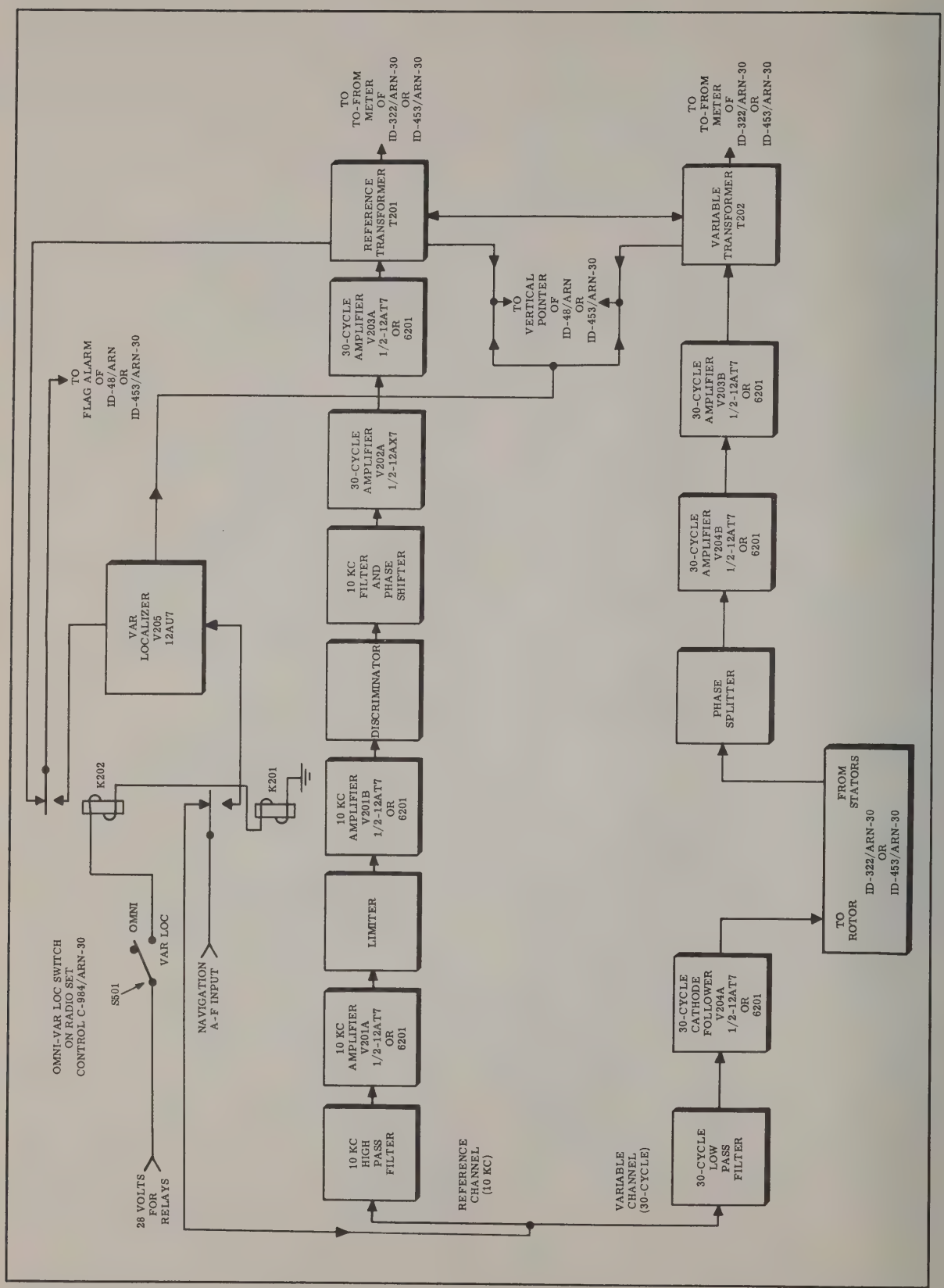

TO TO-FROM METER OF ID-322/ARN-30 OR ID-453/ARN-30
REFERENCE TRANSFORMER T201
VARIABLE TRANSFORMER T202
30-CYCLE AMPLIFIER V203A 1/2-12AT7 OR 6201
30-CYCLE AMPLIFIER V203B 1/2-12AT7 OR 6201
TO VERTICAL POINTER OF ID-48/ARN OR ID-453/ARN-30
TO FLAG ALARM OF ID-48/ARN OR ID-453/ARN-30
30-CYCLE AMPLIFIER V202A 1/2-12AX7
30-CYCLE AMPLIFIER V204B 1/2-12AT7 OR 6201
10 KC FILTER AND PHASE SHIFTER
DISCRIMINATOR
PHASE SPLITTER
VAR LOCALIZER V205 12AU7
10 KC AMPLIFIER V201B 1/2-12AT7 OR 6201
30-CYCLE CATHODE FOLLOWER V204A 1/2-12AT7 OR 6201
LIMITER
TO ROTOR ID-322/ARN-30 OR ID-453/ARN-30
FROM STATORS
10 KC AMPLIFIER V201A 1/2-12AT7 OR 6201
30-CYCLE LOW PASS FILTER
10 KC HIGH PASS FILTER
K202
K201
OMNI
VAR LOC
S501
OMNI-VAR LOC SWITCH ON RADIO SET CONTROL C-984/ARN-30
NAVIGATION A-F INPUT
28 VOLTS FOR RELAYS
REFERENCE CHANNEL (10 KC)
VARIABLE CHANNEL (30-CYCLE)

Figure 4-7. Signal Data Converter CV-265/ARN-30A, Block Diagram

4-22. The 10-kc f-m signal is diverted by filters into the reference channel consisting of V201A, V201B, V202A, V203A, and T201. The 30-cps amplitude modulated signal is diverted by filters into the variable channel consisting of V204A, V204B, V203B, and T202. The secondary circuits of T201 and T202, together with Indicator ID-48/ARN, determine when the two secondary voltages are 90 degrees out of phase and also, by means of the course indicator TO-FROM meter and associated circuit, determine which phase is leading. The course indicator and its associated circuits can be used to shift the phase of the variable channel signal as desired until Indicator ID-48/ARN reading indicates that the two phases are 90 degrees apart. When this condition exists, the vertical pointer of the ID-48/ARN is centered. All these functions are performed in a single instrument by Course Indicator ID-453/ARN-30. (Refer to paragraph 4-38.)

4-23. The functioning of the VAR and localizer circuits of the converter is described in paragraph 4-42.

4-24. REFERENCE CHANNEL CIRCUIT.

4-25. 10-KC AMPLIFIER, V201A. (See figure 4-8.) The a-f input signal from the cathode of the first audio amplifier in the receiver goes through blocking capacitor C202, which removes the d-c component from the receiver output. The 10-kc f-m signal is passed by a high-pass filter network consisting of C201 and R201. This filter network rejects the 30-cps variable channel signal. V201A amplifies the 10-kc signal to a level of approximately 13 volts. Cathode resistor R202 of V102A is not by-passed and thus the tube operates in a degenerative fashion. This substantially reduces the effect of transconductance and heater and plate voltage variations.

4-26. LIMITER. (See figure 4-8.) The purpose of the limiter is to remove any amplitude modulation which might be present on the 10-kc signal. The limiter consists of CR201, CR202, R204, R205, R206, and R258. This series limiter network clips both the top and bottom of the 10-kc wave until the amplitude is only approximately one-third of its original value. This clipped wave, at the output of the limiter, causes a reading of about 7.5 volts (measured with the Electronic Multimeter ME-6B/U, or equivalent). C203 and C204 isolate the limiter from the d-c plate voltage of V201A and prevent the dc from the limiter from affecting the d-c grid voltage of V201B.

4-27. CLIPPED 10-KC AMPLIFIER. (See figure 4-8.) V201B amplifies the clipped 10 kc from the limiter. R206 is adjusted until the proper 10-kc output is obtained.

4-28. DISCRIMINATOR. (See figure 4-8.) The discriminator consists of Z201, CR203, CR204, C205A, C205B, R210, and R211. The discriminator extracts the 30-cps modulation from the 10-kc f-m signal.

4-29. 10-KC FILTER AND REFERENCE VOLTAGE PHASE SHIFTER. (See figure 4-8.) R212, in conjunction with C206A and C206B, constitutes a low-pass filter to pass the 30 cycles from the discriminator and reject any 10 kc which may be present at the discriminator output. R212 is variable and hence, in combination with C206B, acts as an adjustable phase shifter over a limited range, and is normally set at approximately its midpoint; from that point the phase may be shifted approximately 10 degrees in either direction.

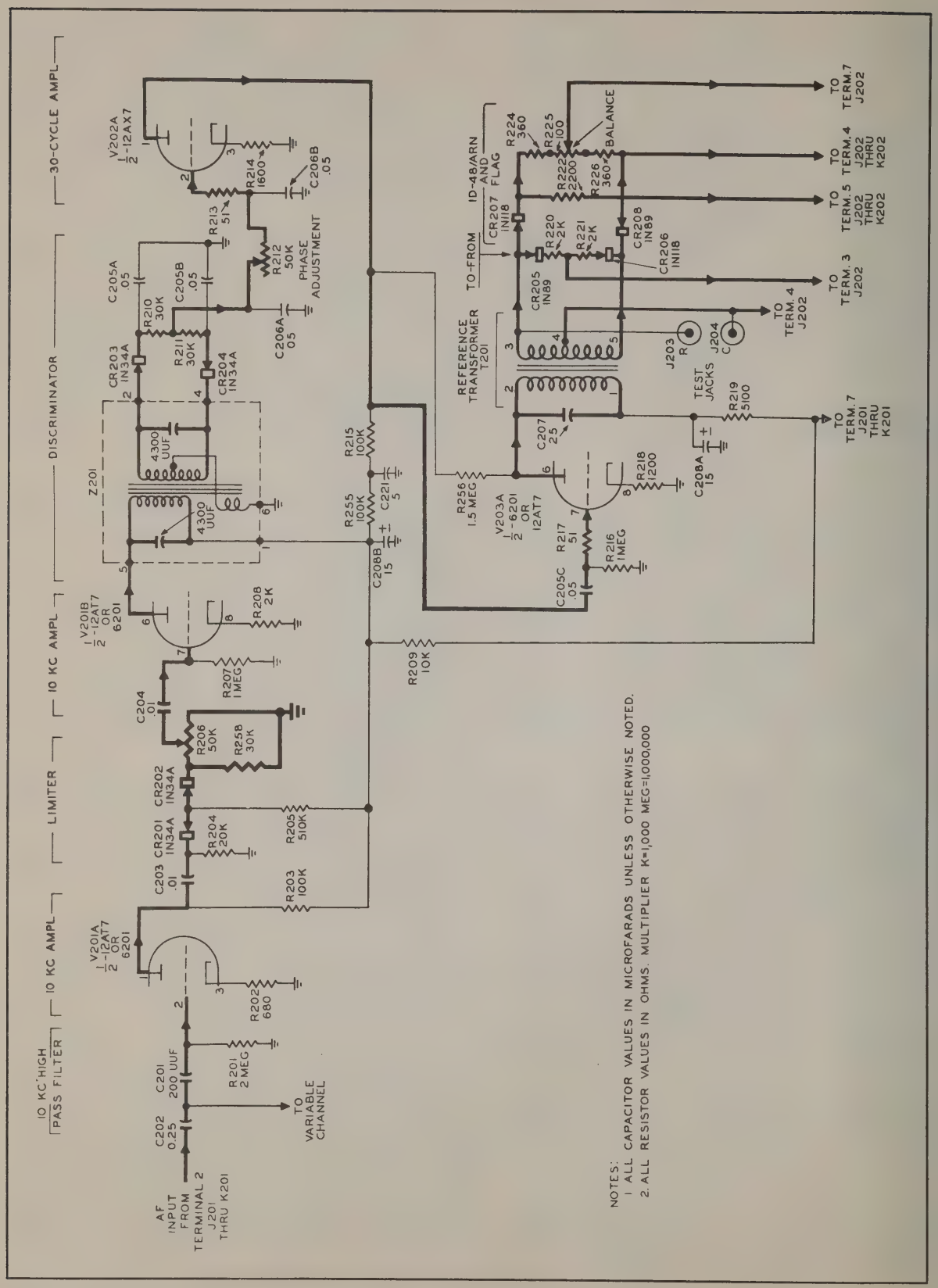
4-30. 30-CYCLE REFERENCE VOLTAGE AMPLIFIER. (See figure 4-8.) V202A and V203A constitute a 30-cps amplifier. The input to V202A is approximately 0.12 volt ac and the output of V203A is approximately 48 volts ac. R213 and R217 are high-frequency oscillation suppressors. R256 is the plate load on V202A and also acts as an oscillation suppressor. Coupling capacitor C205C and grid resistor R216 cause a fixed phase shift of approximately 8 degrees. Output transformer T201 has a tuned primary, tuned by C207 to 30 cycles.

4-31. VARIABLE CHANNEL CIRCUIT. (See figure 4-9.) The 30-cps amplitude-modulated signal coupled through C202 is rejected by the high-pass filter consisting of C201 and R201, but is accepted by the low-pass filter in the grid circuit of V204A.

4-32. LOW-PASS FILTER. (See figure 4-9.) The low-pass filter consisting of L201, C209, C210, C211, and C212 is an M-derived type, which passes 30 cycles with very little attenuation, markedly suppresses 60 cycles (to eliminate components at 60 cps which may be caused by propeller modulation at the receiver end), and also suppresses the voice and 10-kc signals. R229 is the input termination of this filter.

4-33. 30-CYCLE CATHODE FOLLOWER. (See figure 4-9.) V204A couples the 30-cycle output of the low-pass filter (high impedance) to the course indicator (low impedance). Resistor R230 is used to suppress high-frequency oscillations. The rotor circuit of the course indicator is used as an unbypassed cathode impedance. The d-c voltage developed across this cathode impedance (6.5 volts dc) would be an excessive amount of grid bias; consequently, a voltage divider, consisting of R227 and R228, is used so that only half of this bias exists between grid and cathode.

4-34. The rotor inductance of Course Indicator ID-322/ARN-30 is approximately 3.5 henries and its resistance is 600 ohms. Course Indicator ID-453/ARN-30 has a rotor inductance of 4.12 henries and a resistance of 675 ohms. In each, the rotor impedance is built out with additional resistors to make the resistance of the rotor circuit much more stable with temperature changes than would be the case if the resistance were completely determined by the resistance of the copper wire used in the rotor.



NOTES:
1. ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTOR VALUES IN OHMS. MULTIPLIER K=1,000 MEG=1,000,000

Figure 4-8. Reference Channel Circuit, Schematic Diagram

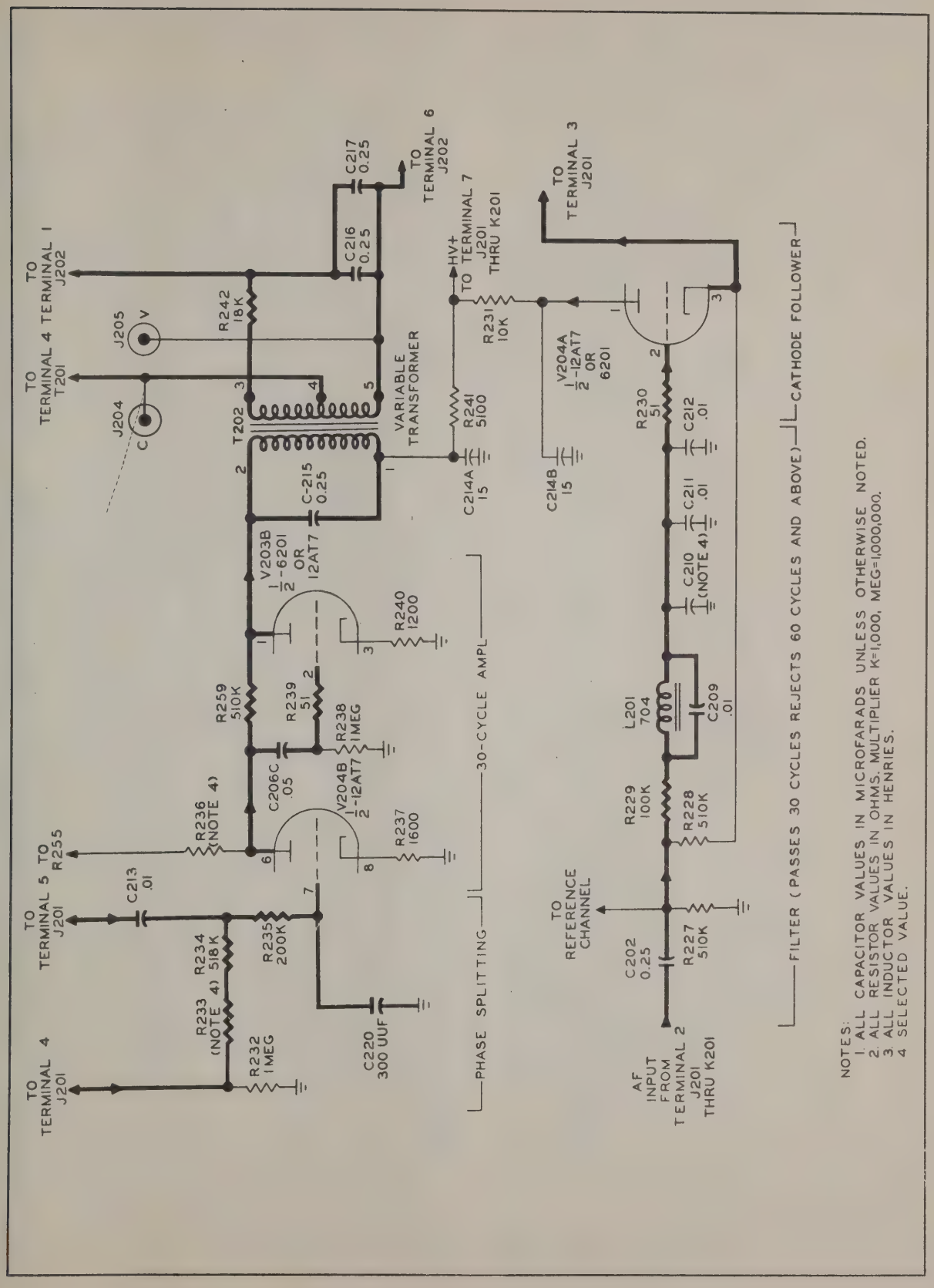


Figure 4-9. Variable Channel Circuit, Schematic Diagram

4-35. COURSE INDICATOR PHASE CONTROL. (See figure 4-9.) The two stator windings of both course indicators, which are spaced 90 degrees apart, feed the circuit consisting of R233, R234, and C213. Since the voltage of each stator varies according to the sine law as the rotor is revolved, and the two stators are placed 90 degrees apart, the course indicator, in combination with its previously mentioned RC circuit, constitutes a phase shifter. R233 is a selected-value resistor, chosen and installed at the time of final factory adjustment of the converter. Its value is chosen so as to minimize the course error deviation. R232 serves to provide a grid return for V204B in case the course indicator is not connected to the converter. R235 suppresses high-frequency oscillations.

4-36. 30-CYCLE VARIABLE VOLTAGE AMPLIFIER. (See figure 4-9.) The variable-channel 30-cycle amplifier, consisting of V204B and V203B, is almost identical with the previously described 30-cycle amplifier for the reference channel. (Refer to paragraph 4-30.) The gain of this amplifier can be increased or decreased by increasing or decreasing the value of R236 in the plate circuit of V204B; the actual value is selected and installed at the time of final factory adjustment of the converter. T202 is identical to T201.

4-37. PLATE SUPPLY FILTERS. (See figures 4-8 and 4-9.) To avoid coupling by way of the plate voltage supply between various tubes in the reference and variable channels, RC filters are used. These filters consist of R209 and C208B, R219 and C208A, R231 and C214B, and R241 and C214A.

4-38. INDICATOR CIRCUIT. (See figures 4-8 and 4-9.) The circuit in the converter for Indicator ID-48/ARN-30 and for the flag and vertical pointer of Course Indicator ID-453/ARN-30 is essentially a wattmeter. No current flows through the indicator when the outputs of T201 and T202 are out of phase by 90 degrees. If the outputs are not quite out of phase by 90 degrees, the vertical pointer will swing to the left or right, indicating that the signal being received is not quite "on course"; an "on course" signal produces transformer outputs which are out of phase by 90 degrees. This wattmeter circuit consists of CR207, CR209, R224, R225, R226, and the vertical pointer movement of the indicator. The purpose of R224 and R226, in series with CR207 and CR208, respectively, is to build out the forward resistance of these two crystals to a point where normal changes in the forward current resistance of the crystals are relatively unimportant. The purpose of the adjustable resistance, R225, is to permit the selection of a true mid-tap point between the crystals. It is necessary that this true mid-tap be used; otherwise, the voltage from T201 alone would cause a deflection of the vertical point in the indicator. In a wattmeter circuit the presence of voltage in one phase alone cannot cause current to flow in the meter.

4-39. FLAG CIRCUIT. (See figures 4-8 and 4-9.) The flag is operated by the same pair of crystals used in the indicator circuit. In this circuit, however, the flag current results from the sum of the outputs from T201 and T202, and hence the loss of output from either T201 or T202 results in a substantial reduction of flag current.

4-40. TO-FROM CIRCUIT. (See figures 4-8 and 4-9.) The TO-FROM meter circuit is similar to the wattmeter circuit described in paragraph 4-38; however, the voltage from T202, which feeds this wattmeter circuit, is shifted approximately 90 degrees by R242, C216, and C217. This circuit uses crystals CR205, CR206, and resistors R220 and R221. Since this wattmeter operates at approximately 90 degrees from the incoming signal, it resolves the ambiguity of the two positions of the indicator at which the vertical pointer reads zero.

4-41. TEST JACKS. Three test connectors, J203, J204, and J205, are incorporated in the converter. J204 is the common test connection. A voltmeter connected between J203 and J204 will permit the measurement of the output reference channel voltage; when connected to J205 and J204 the voltmeter will permit the measurement of the output variable channel voltage.

4-42. VAR AND LOCALIZER CIRCUITS. (See figure 4-10.) The VAR or localizer circuit of the converter is a two-stage resistance-coupled amplifier designed to accept the VAR and localizer information delivered by the receiver and convert it to a form which is presented visually through the LOCALIZER OR RANGE (vertical) pointer of Indicator ID-48/ARN or Indicator ID-453/ARN-30. When the OMNI-VAR LOC switch of the control unit is set to the VAR LOC position, K201 and K202 are energized. K201 connects the audio output of the receiver (terminal 2, J201) to the grid of V205A through C218. The two triode sections of V205 constitute a conventional two-stage amplifier whose output is fed to a 90-cps and a 150-cps filter in parallel. The cathodes of V205 are not by-passed; hence they cause degeneration which makes the amplifier relatively independent of variations in heater and plate voltages. R245, which is factory-set and locked, adjusts the amplifier gain which in turn determines the course-width sensitivity. The gain at 90 cps is substantially the same as the gain at 150 cps. The 90-cps component of the input signal is selected by the 90-cps filter Z202 which feeds CR209. The 150-cps component is selected by Z203 which feeds CR210. In order to make the output voltages of the two filters equal, variable resistor R250 is used to control the relative output of these filters. The outputs of Z202 and Z203 are used in a balanced circuit so that when they are equal no voltage is produced across the vertical pointer movement which is connected across R252 and R253. The 90-cps output produces a voltage drop across R252 which is equal and opposite to the voltage drop across R253 caused by the output of the 150-cps filter. Each filter output produces a voltage drop, in the same sense, across R251, the sum of which causes a flag current. This current will be substantially reduced by a loss in either output. The flag-warning movement of the indicator is connected to terminals 4 and 5 of J202 by K202.

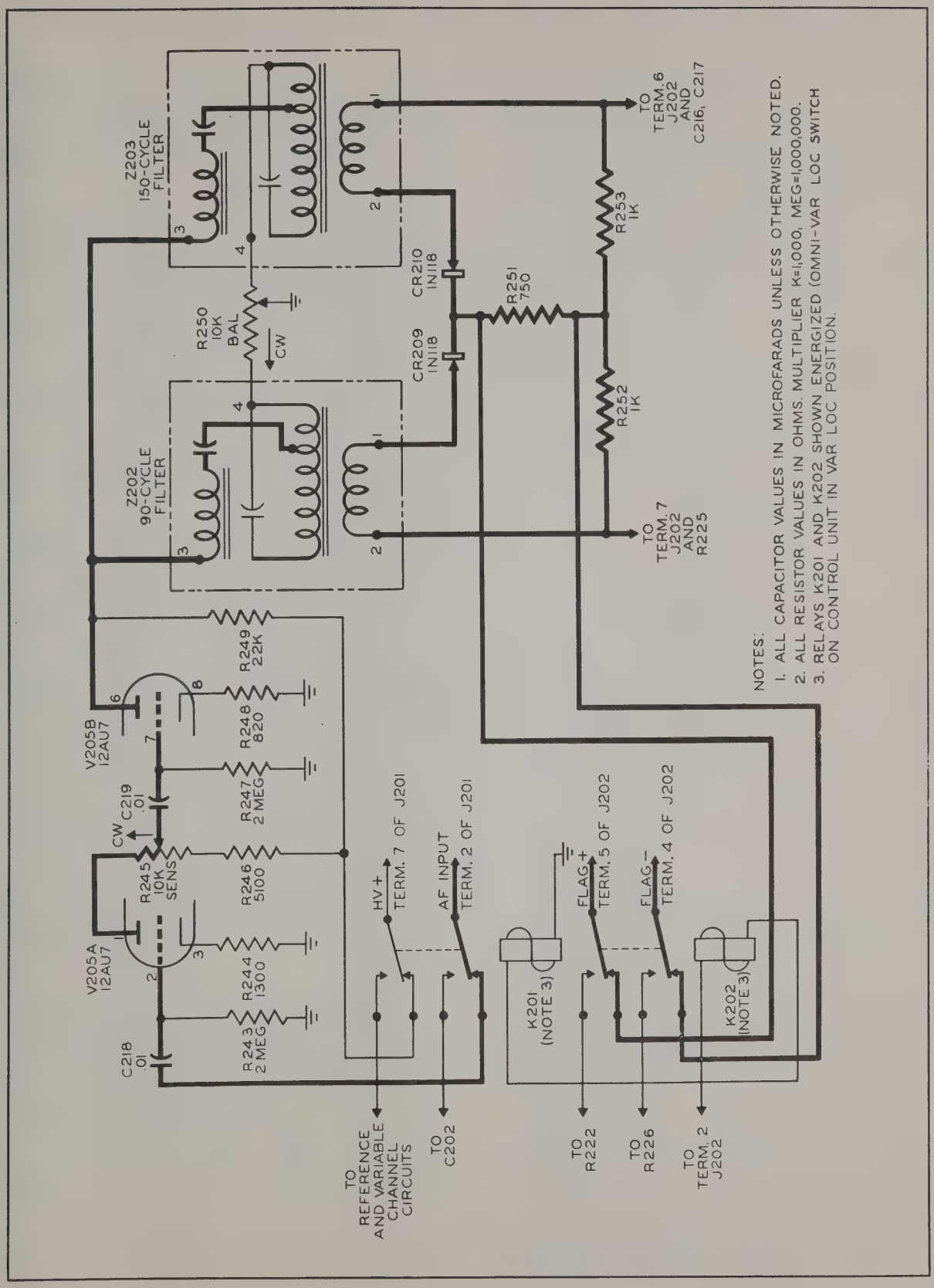


Figure 4-10. VAR and Localizer Circuits, Schematic Diagram

4-43. SIGNAL DATA CONVERTER CV-265A/ARN-30A.

4-44. GENERAL. (See figure 4-11.) The functions of Signal Data Converter CV-265A/ARN-30A are the same as those of Signal Data Converter CV-265/ARN-30A and many of the circuits of both are the same. The major over-all difference between the two converters is that in CV-265/ARN-30A, the amplitude modulation is used in a variable channel to energize the rotor of the resolver in the course indicator. The stator outputs are then applied through amplifiers to the variable transformer and compared with the output of the reference transformer which stems from the frequency modulation. In CV-265A/ARN-30A, the frequency-modulated channel is the variable channel and energizes the rotor of the course indicator resolver. The stator outputs are brought back through amplifiers to the variable transformer and the phase compared to the phase of the 30-cps amplitude modulation output which is the reference.

4-45. As in Signal Data Converter CV-265/ARN-30A, the inputs to the omni circuits are 30 cps and 9960 kc, frequency modulated at 30 cps, which come in at terminal 2 of jack J204. Filters divide the two frequencies at the channel inputs.

4-46. 10-KC CHANNEL.

4-47. 10-KC AMPLIFIER. (See figure 4-12.) The frequency-modulated signal is diverted into the 10-kc channel with a 10-kc high-pass filter consisting of capacitor C201, which is a high impedance to the 30-cps reference channel signal. The f-m signal is amplified in the V201A stage and impressed on a positive and negative clipper consisting of CR201, CR202, R204, and R205, which limits the signal to a value low enough to remove any residual amplitude modulation. To get the signal above the noise level, it is placed on a 95-volt d-c pedestal provided by V202. C202 and C203 are coupling capacitors. The now flat-topped carrier is again amplified in V203.

4-48. DISCRIMINATOR AND 30-CYCLE AMPLIFIER. (See figure 4-12.) The amplified carrier is applied to a frequency discriminator consisting of Z201, CR203, CR204, R211, and R212. The 30-cycle signal appears across R211 and R212 and is coupled through C204 and C205 on 30-cycle amplifier V203B. Phase shift occurring in the discriminator is compensated by a phase-shift network consisting of R213, R214, C206, and C240. C240 is selected at the factory for the required amount of shift. C207A is a decoupling capacitor to keep signal fluctuations out of the high-voltage line.

4-49. CATHODE FOLLOWER. (See figure 4-12.) The amplified 30-cps signal is coupled through C208 to the grid of cathode follower V204A. The cathode load in this stage is the rotor of the course indicator and its padding resistor which are connected in series. The rotor is grounded at one end and so energized by the plate current of the tube. R220 is the plate load of the stage, and capacitors C209A and C209B are decouplers.

4-50. The cathode load, with no signal, keeps the cathode at a d-c level of 6.6 volts. Since this would be excessive bias for the tube, it is compensated by connecting the grid through R218 to the one-volt point on the voltage divider R219, R210 and R206. This reduces the tube bias to five volts.

4-51. PHASE SPLITTER AND 30-CYCLE AMPLIFIER. (See figure 4-12.) The stator windings are grounded at one end. The other ends are connected to the phase splitter consisting of C210, R222, and R221. This is a summing network in which both stator voltages are added. The resulting voltage, with the phase of the greater stator voltage, is impressed on the grid of 30-cycle amplifier V205A after phase adjustment in a network consisting of R223, R224, R225, and C211. The conducting level of the tube is set by potentiometer R226.

4-52. 60-CYCLE TWIN T AND 30-CYCLE AMPLIFIER. (See figure 4-12.) The output of V205A is applied to 30-cycle amplifier V204B through a filter network consisting of C212, C214, C213, C215, R230, R229, and R231. This is a parallel T network designed to reject a 60-cycle frequency. It is in the system to stop any 60-cycle beat note that might develop in the phase splitter or any second harmonic of 30 cycles that might develop in the resolver. C216 and C217 together, form a coupling capacitance and R232 is a grid return resistor. The output of V204B is impressed through variable transformer T201 on two rectification circuits which are connected to the indicators. The indicator circuits are described in subsequent paragraphs.

4-53. 30-CYCLE REFERENCE CHANNEL.

4-54. 30-CYCLE LOW-PASS FILTER AND 30-CYCLE AMPLIFIER. (See figure 4-13.) The 30-cycle input to the reference channel comes into the first 30-cycle amplifier V205B by way of a low-pass filter consisting of R241, R242, R243, R244, C221, C222, C223, C224, and C225. This filter passes the frequencies near 30 cycles and attenuates any residual carrier frequency voltage in the signal.

4-55. 60-CYCLE TWIN T AND 30-CYCLE OUTPUT AMPLIFIER. (See figure 4-13.) After amplification in V205B, the 30-cycle signal is impressed on a parallel T network. This is a sharp rejection filter designed to eliminate 60-cycles, the second harmonic of the 30-cycle input. The 30-cycle output of the filter is applied to the grid of V201B through parallel coupling capacitors C230, C231, and C232. Potentiometer R250 acts as a grid return resistor and also sets the output level of the channel. The output of V201B is impressed on the indicator circuits through reference transformer T201, the center tap of which is connected to the center tap of the variable transformer T202.

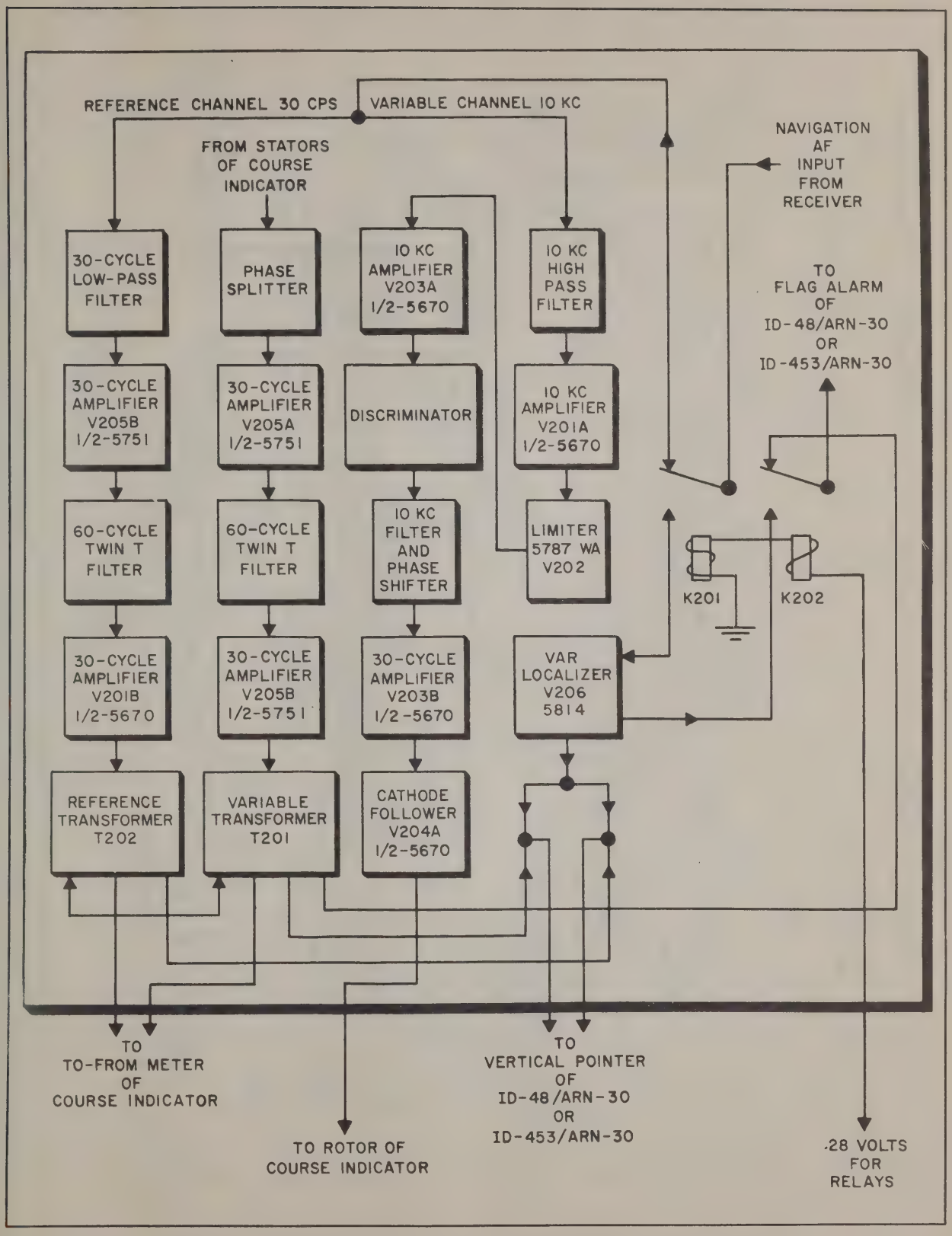

REFERENCE CHANNEL 30 CPS
VARIABLE CHANNEL 10 KC
FROM STATORS OF COURSE INDICATOR
NAVIGATION AF INPUT FROM RECEIVER
30-CYCLE LOW-PASS FILTER
PHASE SPLITTER
10 KC AMPLIFIER V203A 1/2-5670
10 KC HIGH PASS FILTER
TO FLAG ALARM OF ID-48/ARN-30 OR ID-453/ARN-30
30-CYCLE AMPLIFIER V205B 1/2-5751
30-CYCLE AMPLIFIER V205A 1/2-5751
DISCRIMINATOR
10 KC AMPLIFIER V201A 1/2-5670
60-CYCLE TWIN T FILTER
60-CYCLE TWIN T FILTER
10 KC FILTER AND PHASE SHIFTER
LIMITER 5787 WA V202
K201
K202
30-CYCLE AMPLIFIER V201B 1/2-5670
30-CYCLE AMPLIFIER V205B 1/2-5751
30-CYCLE AMPLIFIER V203B 1/2-5670
VAR LOCALIZER V206 5814
REFERENCE TRANSFORMER T202
VARIABLE TRANSFORMER T201
CATHODE FOLLOWER V204A 1/2-5670
TO TO-FROM METER OF COURSE INDICATOR
TO ROTOR OF COURSE INDICATOR
TO VERTICAL POINTER OF ID-48/ARN-30 OR ID-453/ARN-30
28 VOLTS FOR RELAYS

Figure 4-11. Signal Data Converter CV-265A/ARN-30A, Block Diagram

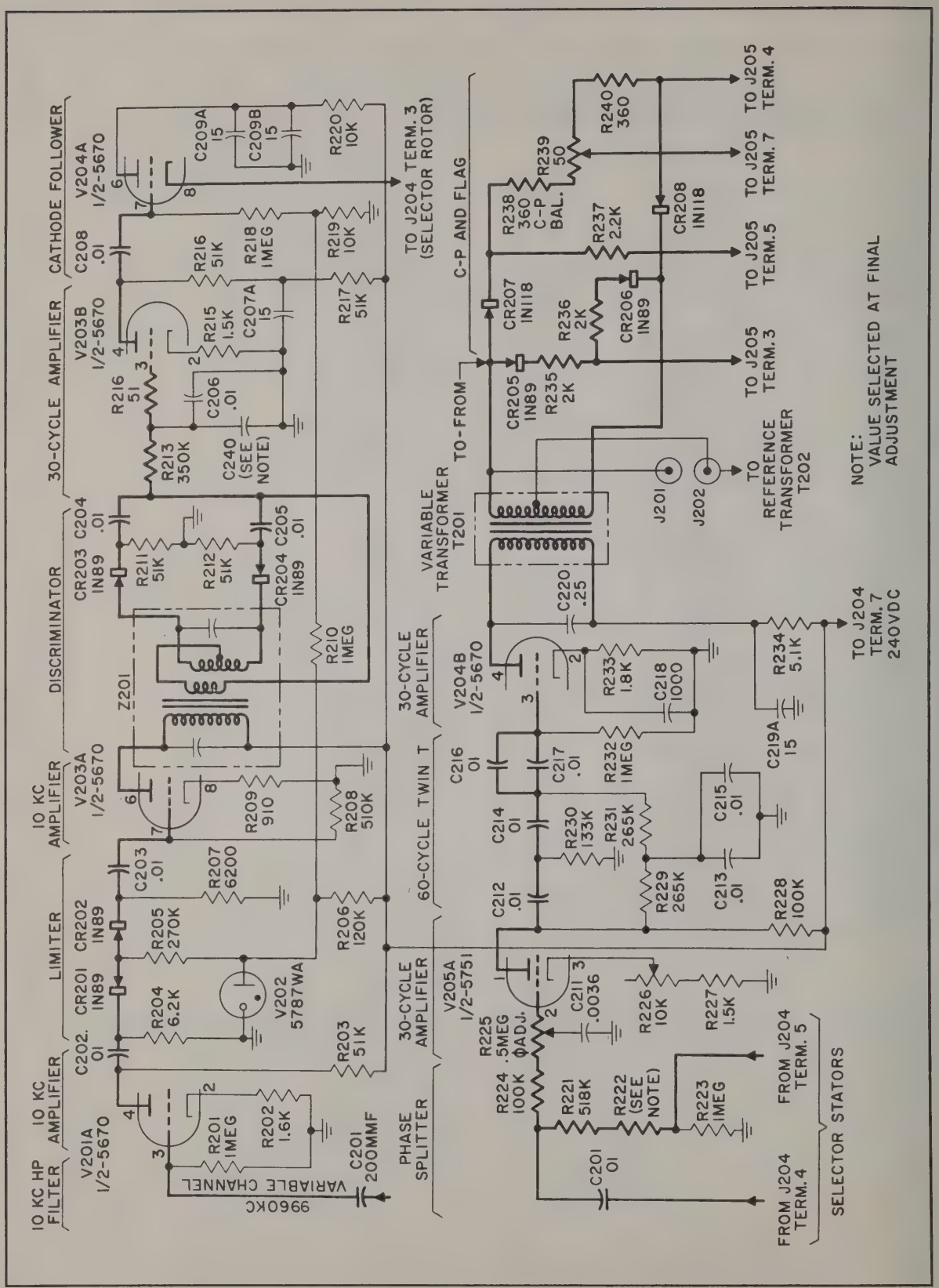


Figure 4-12. Variable Channel Circuit, Schematic Diagram

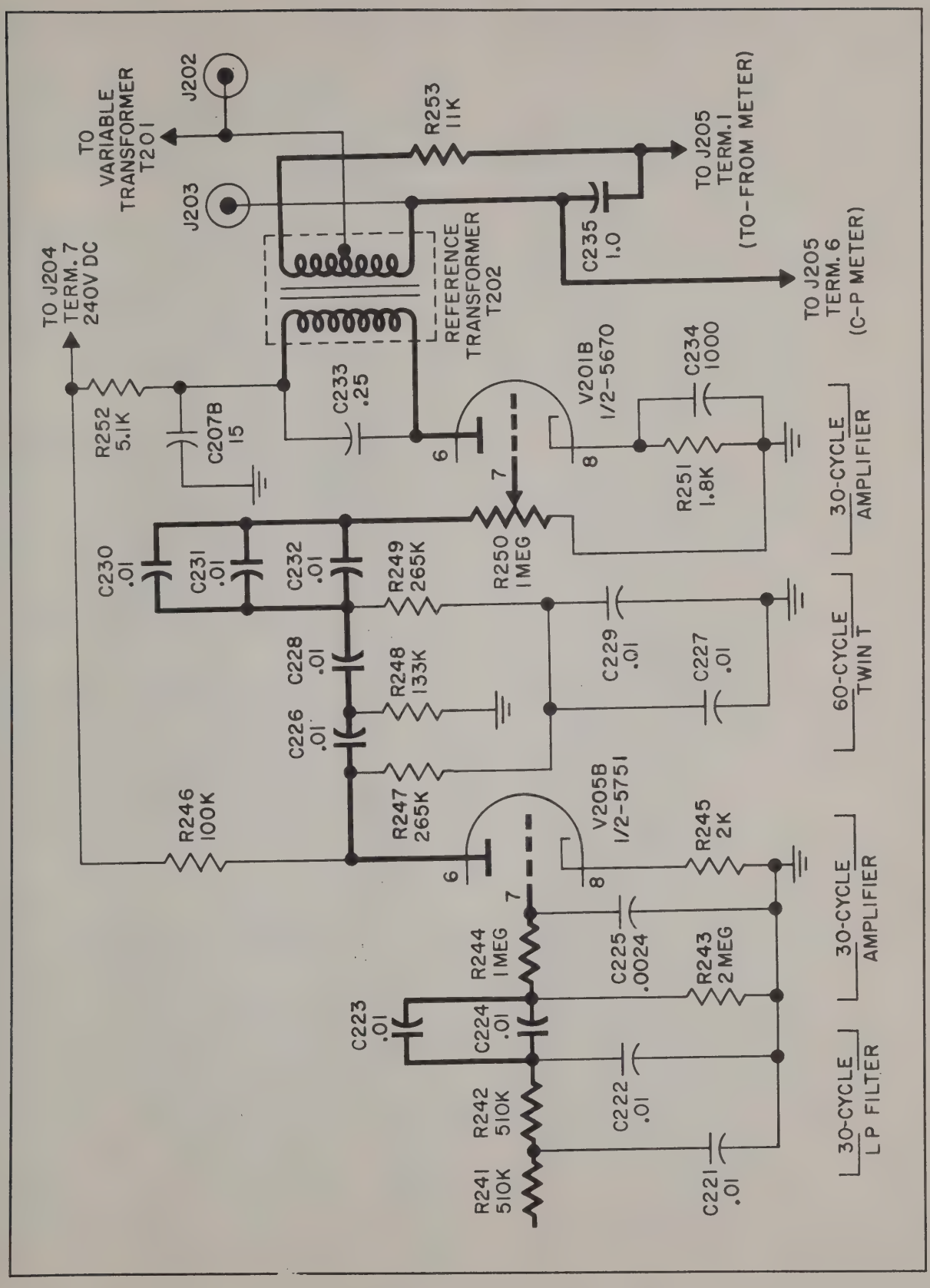


Figure 4-13. Reference Channel Circuit, Schematic Diagram

4-56. VERTICAL POINTER INDICATOR CIRCUIT. (See figures 4-12 and 4-13.) The vertical pointer circuit in Signal Data Converter CV-265A/ARN-30A works as the vertical pointer circuit in Signal Data Converter CV-265/ARN-30A. (Refer to paragraph 4-38.) The circuit is essentially a wattmeter in which no current flows when the outputs of T201 and T202 are out of phase by 90 degrees. If the outputs are not 90 degrees out of phase, the indicator swings right or left, depending on whether the phase difference is more or less than 90 degrees. Since an "on course" signal produces a zero pointer indication, a needle deflection from zero indicates the signal is not "on course". The wattmeter circuit consists of CR207, CR208, R238, R239, R240, and the vertical pointer movement in the indicator. R238 and R240 build out the forward resistance of the crystals to reduce the current effects of normal changes in the forward resistance of the crystals. R239 permits adjustment to a true voltage midpoint between the crystals to prevent a needle deflection caused by a voltage in T201 only.

4-57. FLAG CIRCUIT. (See figures 4-12 and 4-13.) The flag is also operated by the current through CR207 and CR208; the current in the flag circuits results from the sum of the outputs from T201 and T202. Consequently, a reduction of output from either transformer results in a large drop in current.

4-58. TO-FROM CIRCUIT. (See figures 4-12 and 4-13.) The TO-FROM meter circuit is similar to the wattmeter circuit described in paragraph 4-56. However, the output from T202 is shifted approximately 90 degrees out of phase by R253 and C235. The circuit consists of CR205, CR206, R235, and R236. This wattmeter operates at approximately 90 degrees from the vertical pointer circuit; it resolves the ambiguity of the two conditions under which the vertical pointer reads zero.

4-59. TEST JACKS. Test jacks J201, J202, and J203 permit easy measurement of output voltages. Jack J202 is the common jack. The variable channel output is measured between J201 and J202 and the reference channel output is measured between J203 and J204.

4-60. VAR AND LOCALIZER CIRCUITS. (See figure 4-14.) The VAR or localizer circuit of CV-265A/ARN-30A closely resembles the same circuit in CV-265/ARN-30A and works in the same fashion. (Refer to paragraph 4-42.) The major difference between the two is in the control grid circuits of their two-stage voltage amplifiers. In the CV-265A/ARN-30A version, stability is increased by impressing the signal across a voltage divider and picking off the grid signals from the divider midpoints. In addition, in the output circuit, harmonics developed in 90-cycle and 150-cycle filters Z202 and Z203 are bypassed by capacitors C238 and C239. In all other respects the circuits are the same.

4-61. MOUNTING MT-1175/ARN-30A. (See figure 4-15.) Mounting MT-1175/ARN-30A provides a mounting for the receiver and converter, and serves as a junction box for the set.

4-62. Twenty-eight volts dc from the aircraft primary power source is brought in through J305 and to terminal A of J304. When the control unit OFF switch is turned on, K301 is energized and the primary power is furnished to the receiver and dynamotor through terminal 6 of J301, and to the converter through terminal 1 of J302. (The circuits are completed through the respective ground connections.) Filter Z301 attenuates frequencies in the audio line.

4-63. MOUNTING MT-1508/ARN-30A. (See figure 4-16.) In a two-rack installation, primary power is brought into the set between ground and terminal F of J1804. When the control unit OFF switch is turned on, relay K1801 is energized and distributes primary power to the receiver and dynamotor through terminal 6 of J1801 and to the converter through terminal B of J1804. Filter Z1801 attenuates frequencies in the audio line.

4-64. MOUNTING MT-1509/ARN-30A. (See figure 4-17.) In a two-rack installation, the remaining functions of a one-rack mounting are taken over by the converter rack Mounting MT-1509/ARN-30A. In this rack resistors R1701, R1702, R1703, and R1704 provide the proper loading of the converter for one vertical pointer and one flag alarm. For each additional vertical pointer, either R1701 or R1702 must be removed. For each additional flag alarm, either R1703 or R1704 must be removed. The rack has an r-f jack, J1704, for an r-f cable which carries the a-f signals from a similar jack on the receiver rack.

4-65. DYNAMOTOR DY-86/ARN-30. Dynamotor DY-86/ARN-30 is a completely enclosed and sealed unit used to furnish high voltage to the receiver and converter. The dynamotor is mounted on four shock mounts which are part of the receiver chassis, and is secured by four snapslides. Electrical connections are made through a built-in male connector on the base of the dynamotor. The dynamotor has a rated input of 1.7 amperes at 28 volts dc, and a rated output of 85 ma at 250 volts dc.

4-66. RADIO SET CONTROL C-984/ARN-30. (See figure 4-18.) Radio Set Control C-984/ARN-30 provides remote power control of the set and remote tuning of the receiver. The OFF control is combined with a volume level control. A two-position switch for selection of either VOR or VAR and localizer operation is included. When S502 is closed, primary power is provided to all units of the set through the energizing of power relay K301 in Mounting MT-1175/ARN-30A or of relay K1801 in Mounting MT-1508/ARN-30A. The audio volume level is controlled by R501. The OMNI-VAR LOC switch energizes relays K201 and K202 in the converter. These relays transfer the high voltage, audio signal, and indicator flag circuits in the converter to either the omni or VAR and localizer circuits. Radio Set Control C-1254/ARN-30 (paragraph 4-67) is functionally interchangeable with C-984/ARN-30, but requires different mounting facilities.

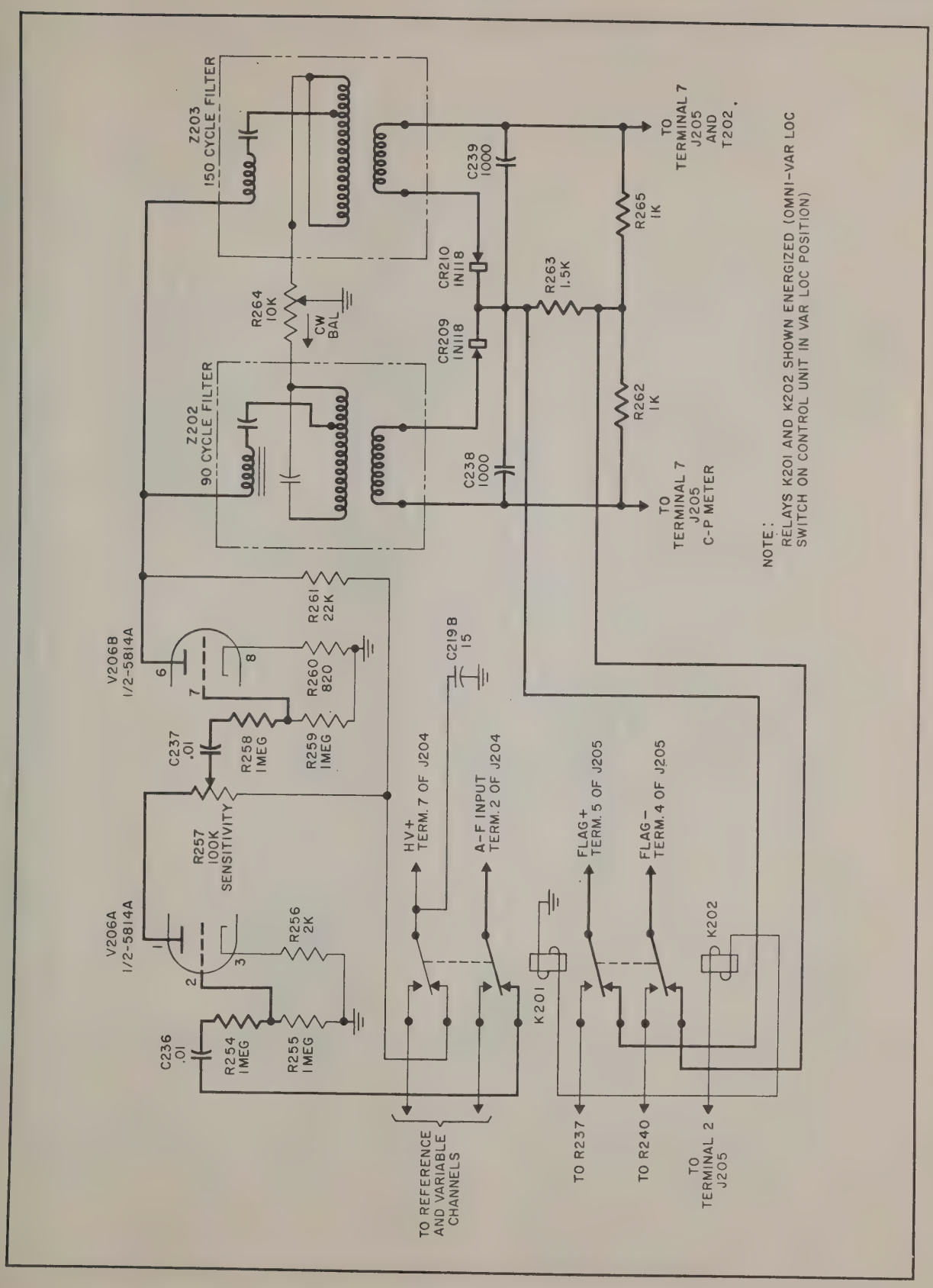


Figure 4-14. VAR and Localizer Circuits, Schematic Diagram

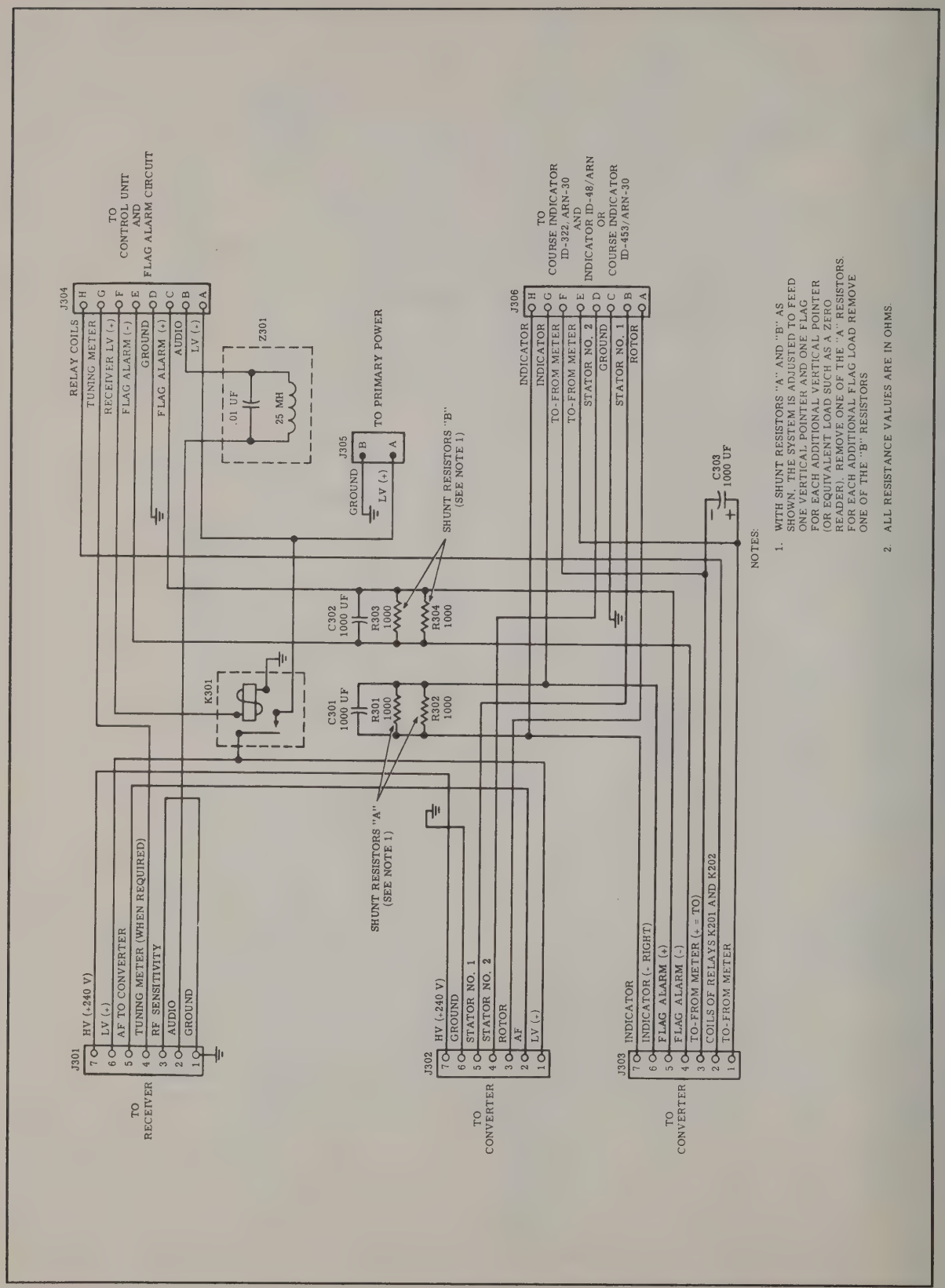


Figure 4-15. Mounting MT-1175/ARN-30A, Schematic Diagram

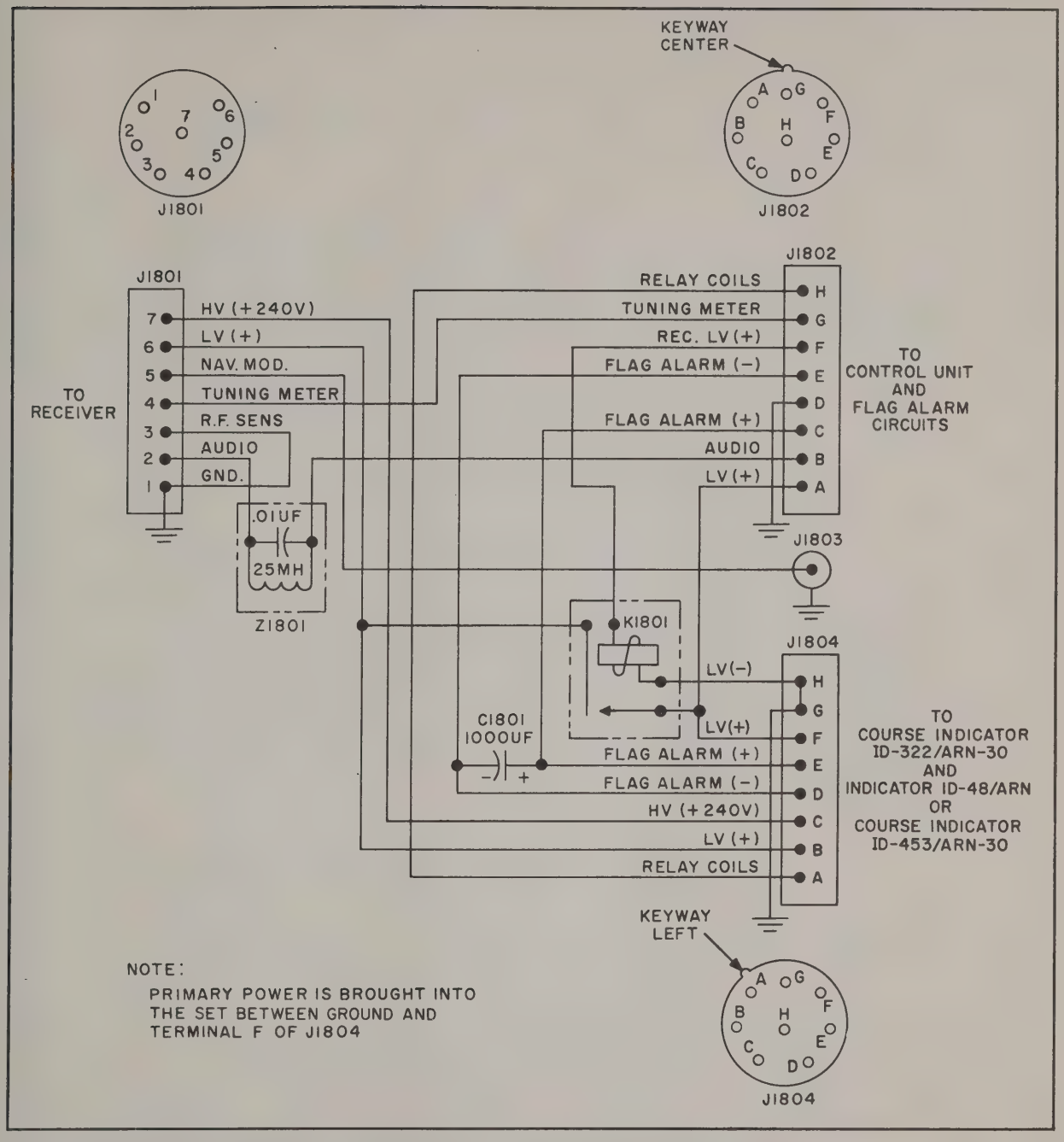


Figure 4-16. Mounting MT-1508/ARN-30A, Schematic Diagram

4-67. RADIO SET CONTROL C-1254/ARN-30. (See figure 4-19.) Radio Set Control C-1254/ARN-30 provides the same functions as Radio Set Control C-984/ARN-30 (paragraph 4-66), for which it is interchangeable. The C-1254/ARN-30 differs from the C-984/ARN-30 in the following major respects. The C-1254/ARN-30 is designed for installation in aircraft where console mounting facilities are available. Primary power is controlled by S1501, which is combined with the audio volume level control R1501. The C-1254/ARN-30 contains three light assemblies for edge-lighting its plastic front panel. Power to these lamps is brought in through a separate cable wire and controlled by the aircraft panel light control. For further details refer to paragraph 4-66.

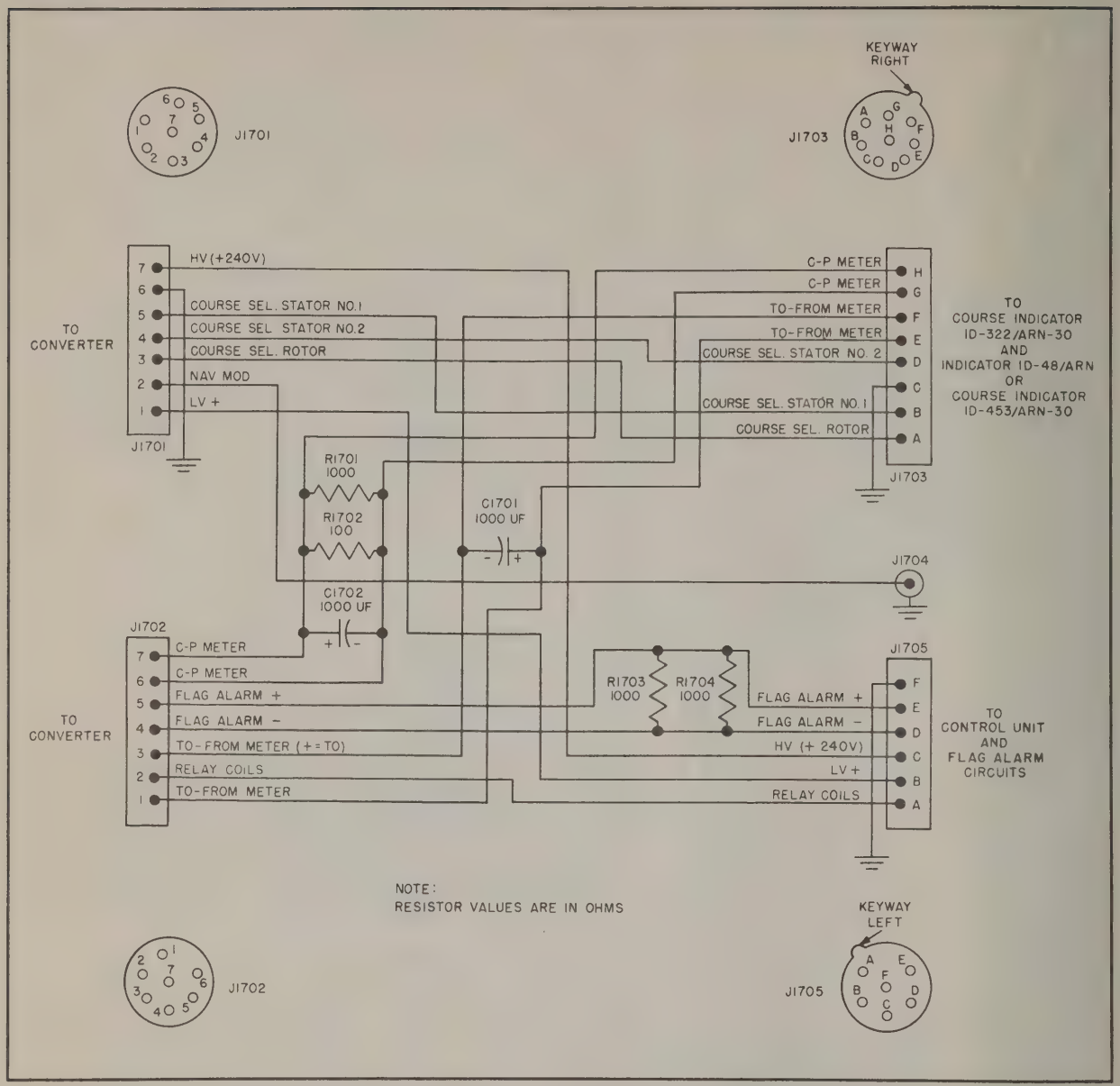


Figure 4-17. Mounting MT-1509/ARN-30A, Schematic Diagram

4-68. INDICATOR ID-48/ARN.

Note

Indicator ID-48/ARN is covered in existing service publications AN 16-35ID48-3, "Handbook Overhaul Instructions Indicator ID-48/ARN," and T. O. No. 16-35ID48-4, "Parts Catalog Instrument Approach Indicator Type ID-48/ARN".

Indicator ID-48/ARN is a special type of microammeter with two pointers. The vertical pointer visually indicates the VOR, VAR, or localizer information received from the converter circuits. The instrument consists of two pointer mechanisms and two flag-alarm mechanisms for indicating the operating or non-operating condition of the pointer mechanisms. The vertical pointer (LOCALIZER OR RANGE) is pivoted at the top and moves left and right. It supplies a visual indication of the lateral position of the aircraft with respect to the on-course signal of the omni or localizer beam. The flag-alarm associated with the vertical pointer in conjunction with the TO-FROM meter of the course indicator serves to indicate the presence or absence of proper output signals from the converter. The hori-

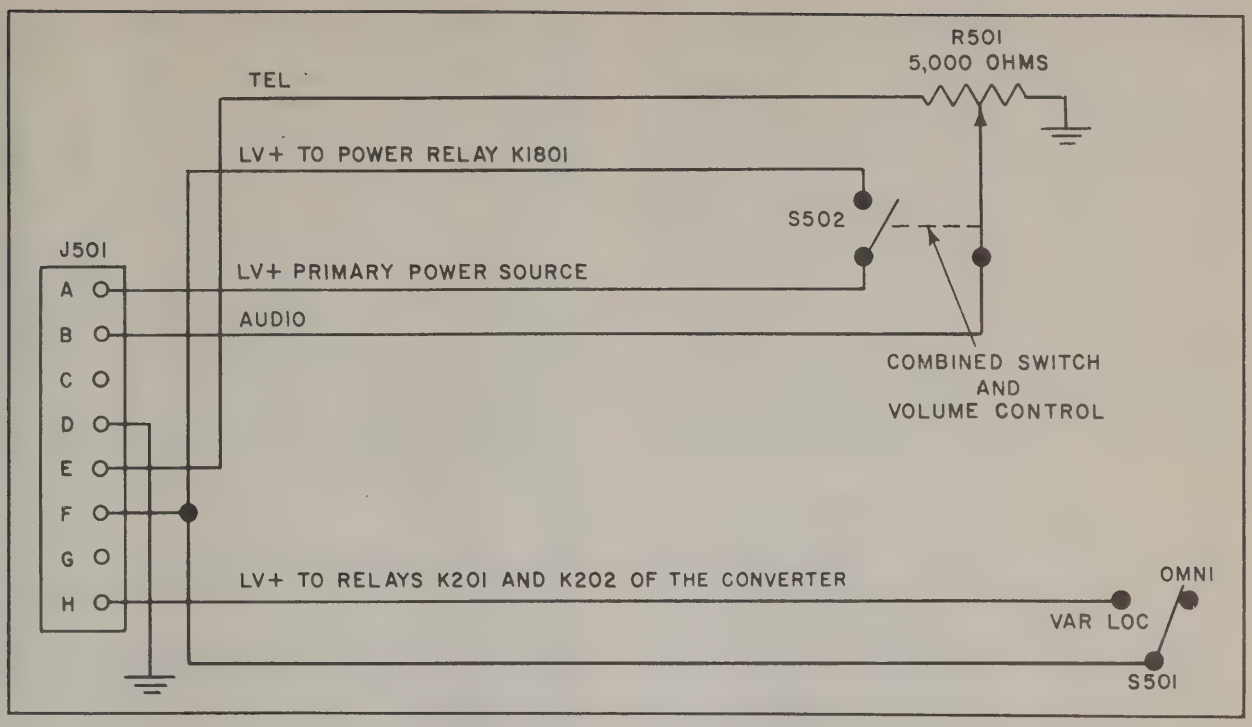


Figure 4-18. Radio Set Control C-984/ARN-30, Schematic Diagram

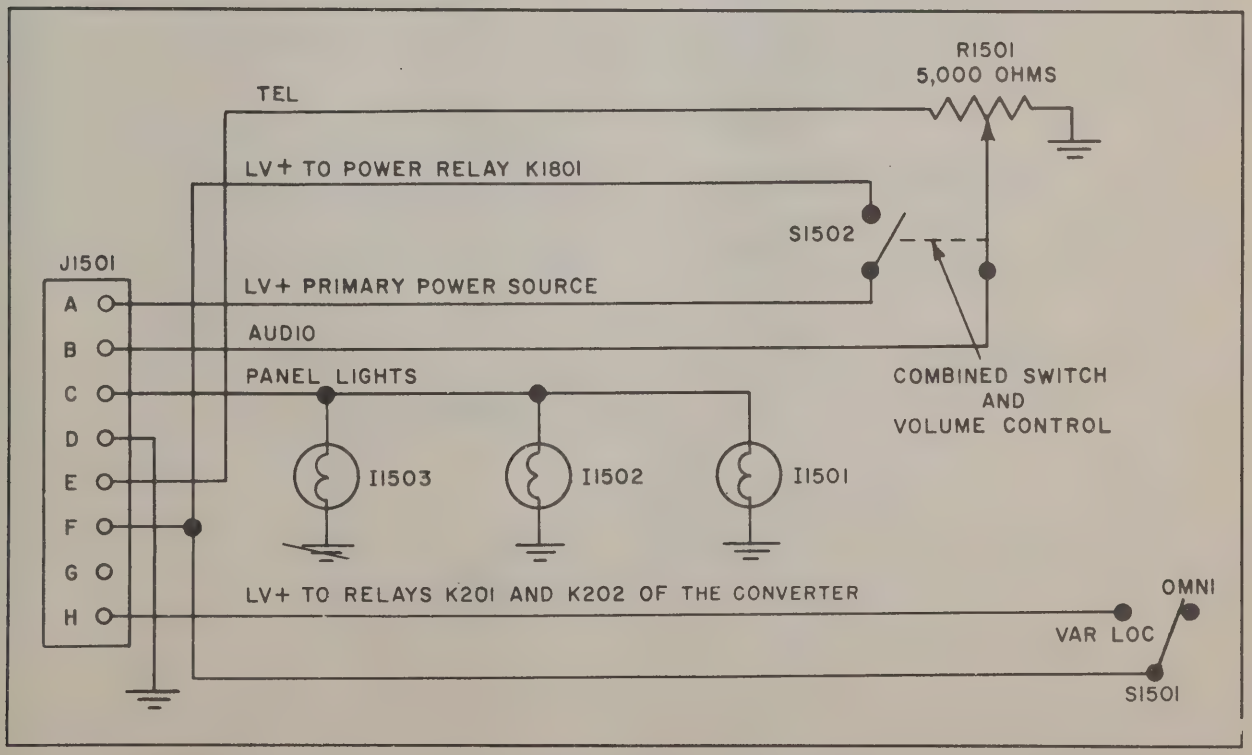


Figure 4-19. Radio Set Control C-1254/ARN-30, Schematic Diagram

zontal pointer (GLIDE PATH) is pivoted at the left and moves up and down. This pointer is generally used in conjunction with a glide-slope receiver to show the relationship of the aircraft to the glide path beam; it is not used insofar as the set operation is concerned since no glide-slope receiver is supplied as part of the set.

4-69. The instrument also contains a beacon lamp and switch assembly located in the lower left corner of the instrument case. This lamp operates when the aircraft is passing through the vertical beam of marker beacon transmitters to provide a visual indication of the distance of the aircraft from the end of the runway.

4-70. As described in paragraphs 4-38 and 4-39, the warning flag operates from the summation of the output from T201 and T202 in the converter; the vertical pointer operates from the difference in output.

4-71. The indicator mechanisms are similar in construction and operating principle. Each mechanism is a permanent-magnet, moving-coil type microammeter, which consists essentially of a moving coil mounted and pivoted in the field of a permanent magnet. Electrical connection is made to the ends of the moving coil through phosphor bronze springs. Current flowing through the coil causes the coil to rotate, moving a pointer attached to the coil across the scale. The deflection of the moving coil is proportional to the current flowing through the coil.

4-72. COURSE INDICATOR ID-322/ARN-30. Course Indicator ID-322/ARN-30 is a combined COURSE SELECTOR and TO-FROM indicating instrument. The COURSE SELECTOR, through adjustment of the COURSE SELECTOR knob and observation of the vertical pointer of Indicator ID-48/ARN, permits the selection of any desired track to or from a VOR station, or indicates the magnetic bearing of the aircraft from a VOR station. The TO-FROM meter of the course indicator is a zero-center d-c instrument which provides the sense information required to resolve any ambiguity in the reading of the COURSE SELECTOR. The TO-FROM meter will show TO when the indicated bearing on the COURSE SELECTOR is the magnetic bearing *to* the station. It will show FROM when the indicated bearing on the COURSE SELECTOR is the magnetic bearing *from* the station. When reading the TO-FROM meter, the vertical pointer of Indicator ID-48/ARN should be approximately centered. When the TO-FROM meter pointer-bar is in the neutral position (within or touching the area marked off by the two white blocks), it may be that the pointer is passing through the neutral position on the way from one indication to the other, or the received signal may be too weak to be reliable, or the received signal may not be a proper signal.

4-73. The basic circuit of Course Indicator ID-322/ARN-30 is shown in figure 4-20. Tube V1 is actually

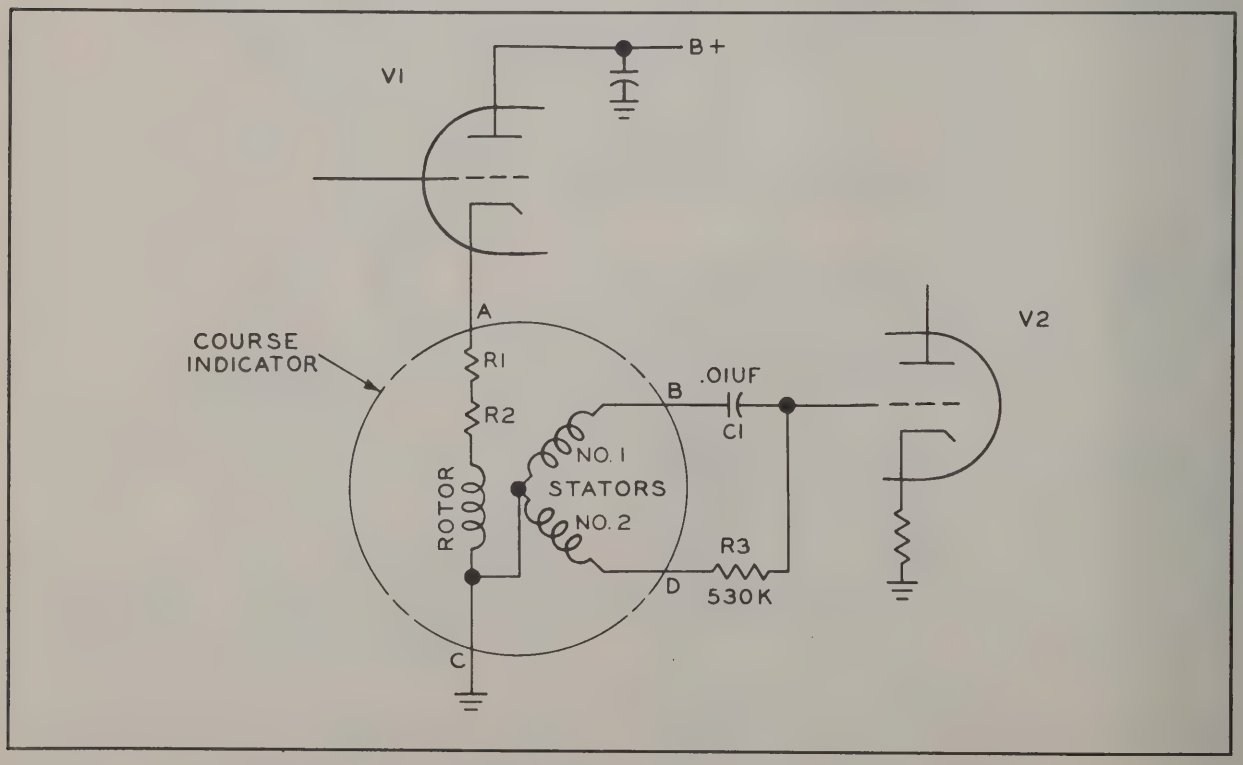


Figure 4-20. Course Indicator ID-322/ARN-30, Basic Schematic Diagram

V204A of either converter, while tube V2 is actually V204B of CV-265/ARN-30A or V205A of CV-265A/ARN-30A. The rotor circuit of the course indicator acts as an unbypassed cathode impedance for V1. The inductance of the rotor is approximately 3.5 henries (+0.35 henry) and 600 ohms (±65 ohms) resistance. The rotor impedance is built out with two series resistors, R1 and R2 (R702), to a total of approximately 2100 ohms. The actual value of R702 is individually selected for each course indicator, though all course indicators are built out to the same total resistance value to make them interchangeable. This added resistance stabilizes the rotor resistance with temperature changes. The two stator windings are spaced 90 degrees apart and feed the C1 and R3. As the rotor is revolved, the voltage of each stator varies according to the sine law. Therefore the combination of C1 and R3, and the course indicator will act as a phase shifter. The output is then fed to V2.

4-74. The operation of the TO-FROM meter circuit is described in paragraph 4-40.

4-75. The scale of the COURSE SELECTOR is marked for 360 degrees with each 30-degree major graduation numerically indicated. The scale and the large end of the pointer indicate the actual angular position of the rotor, while the opposite end of the pointer is a reciprocal reading. The numerals, 10-degree graduation lines, 30-degree major graduation lines, the meter needle, and the TO-FROM meter markings are coated with phosphorescent material. All input and output connections are made through J701, mounted on the rear of the instrument.

4-76. COURSE INDICATOR ID-453/ARN-30. Course Indicator ID-453/ARN-30 performs all the functions of Indicator ID-48/ARN and Course Indicator ID-322/ARN-30. The ID-453/ARN-30 has all the circuits and indicating devices of both of the other indicators and works in the same manner. Except for the connections to input jack J1001, the ID-453/ARN-30 can replace the other two indicators without change. The ID-453/ARN-30 has only one padding resistor in rotor circuit R1601, the value of which is determined at assembly. The instrument can be mounted in the pilot's panel.

4-77. ANTENNA COUPLER ARC TYPE A-17. (See figure 1-1.) The Antenna Coupler ARC Type A-17 provides a broadband coupling network from two rods forming a dipole, into a 50-ohm coaxial line. This unit is used in jet aircraft in which the antenna rods are fastened in place in the shape of a V on the inside of the canopy. The A-17 may also be used to match a dipole antenna mounted on the vertical fin, to a standard 50-ohm coaxial cable. This antenna is coupled to the set through the antenna coupler which furnishes the proper loading. Instructions for installing the antenna coupler are supplied with the unit.

4-78. MOUNTINGS.

4-79. Suitable shock mounts are supplied as part of the set. Mounting MT-1046/ARN-30 is furnished for panel or bulkhead mounting of Radio Set Control C-984/ARN-30. The C-984/ARN-30 is secured to the MT-1046/ARN-30 by means of a single snapslide engaging a stud on the MT-1046/ARN-30. In a one-rack installation, Mounting MT-1174/ARN-30A is supplied as a vibration-type mounting for Mounting MT-1175/ARN-30A. (Refer to paragraph 4-61.) The MT-1175/ARN-30A has four snapslides which engage studs which are part of the vibration mounts of MT-1174/ARN-30A. In a two-rack installation, Mounting MT-1510/ARN-30A is supplied as a vibration mounting for the receiver rack Mounting MT-1508/ARN-30A, and for the converter rack Mounting MT-1509/ARN-30A. Both racks are secured to the vibration mounts with snapslides at the four corners.

4-80. DETAILED BLOCK DIAGRAM.

4-81. A detailed block diagram of a one-rack installation is shown in figure 4-21. A similar diagram of a two-rack installation is shown in figure 4-22.

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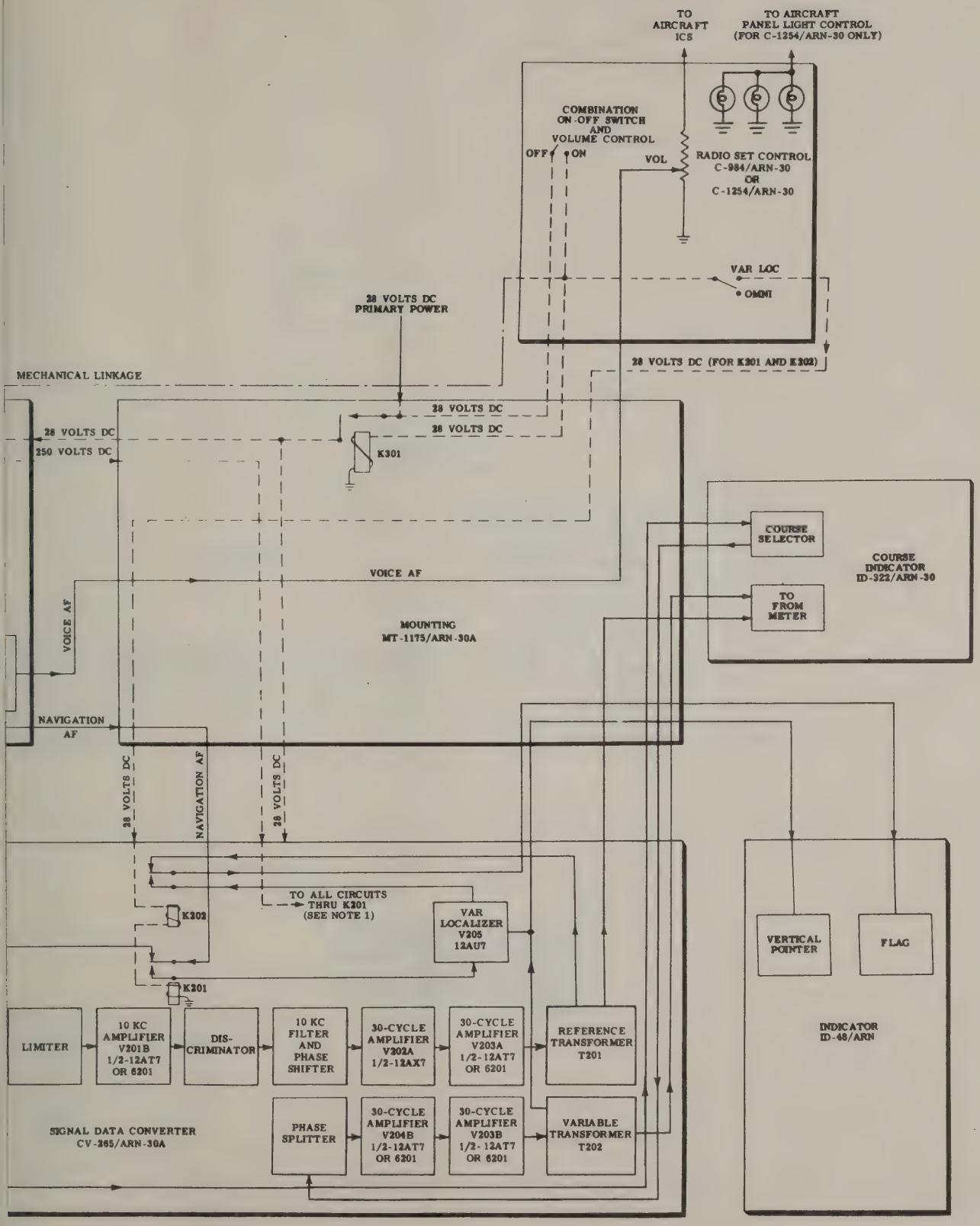

Figure 4-21. One-Rack Installation, Detailed Block Diagram

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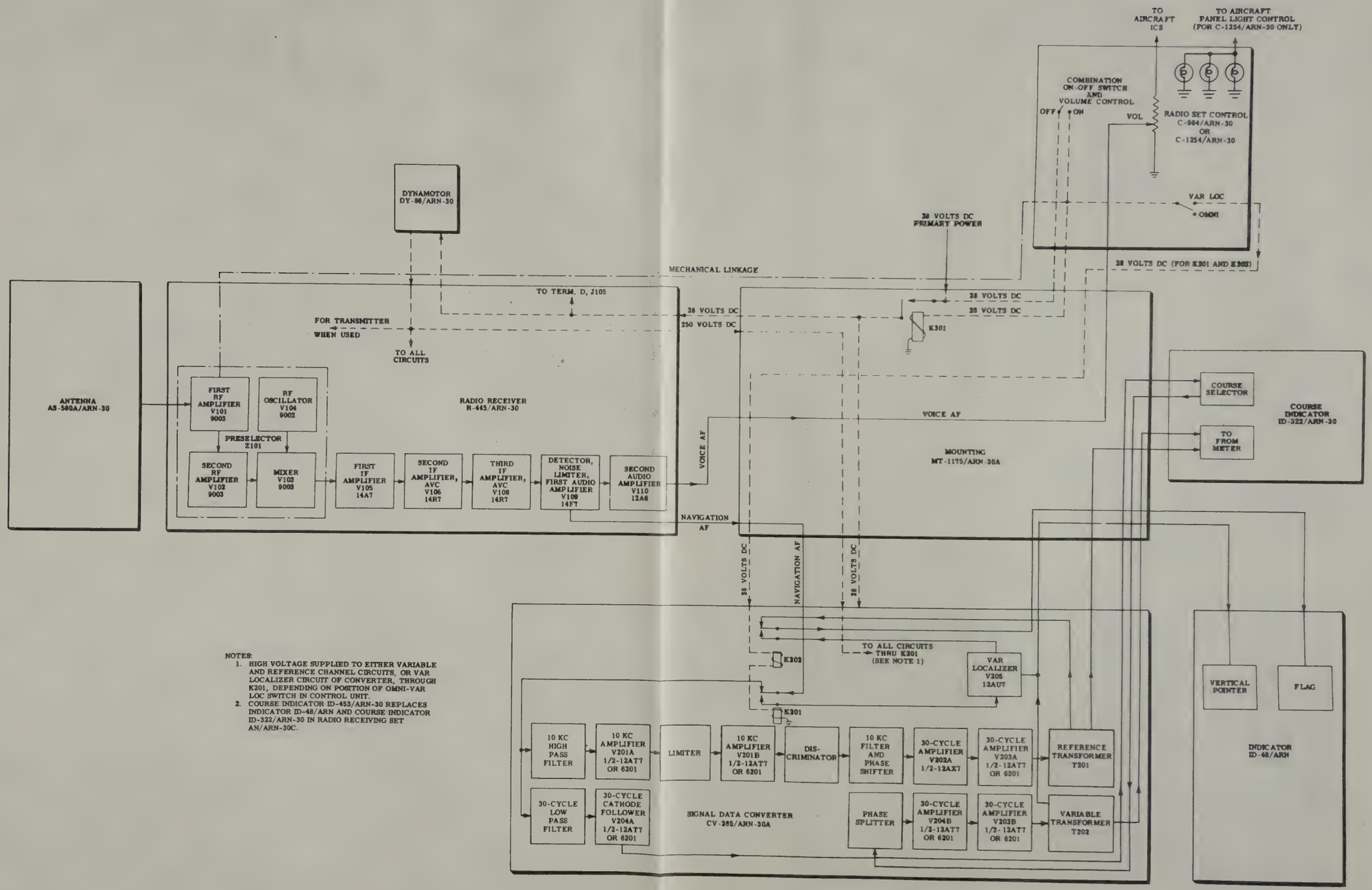
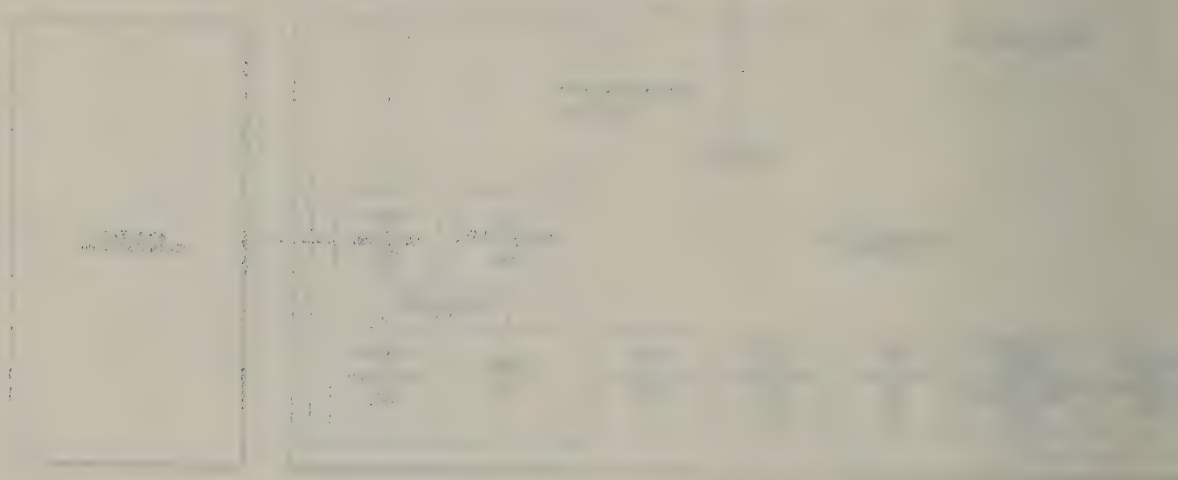
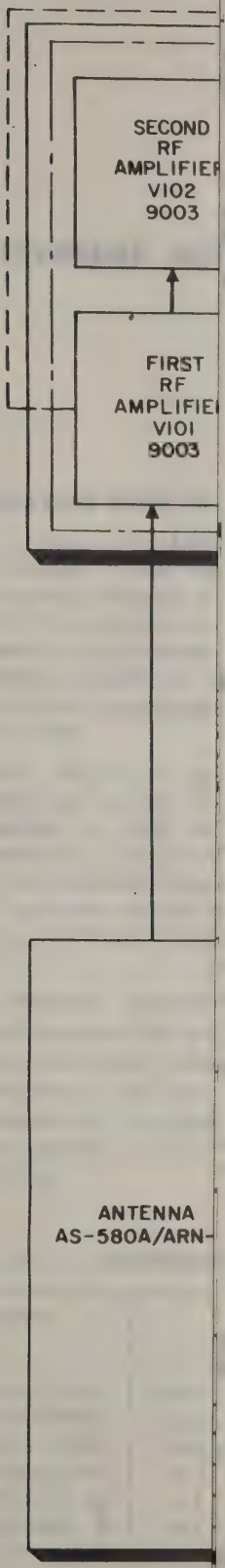
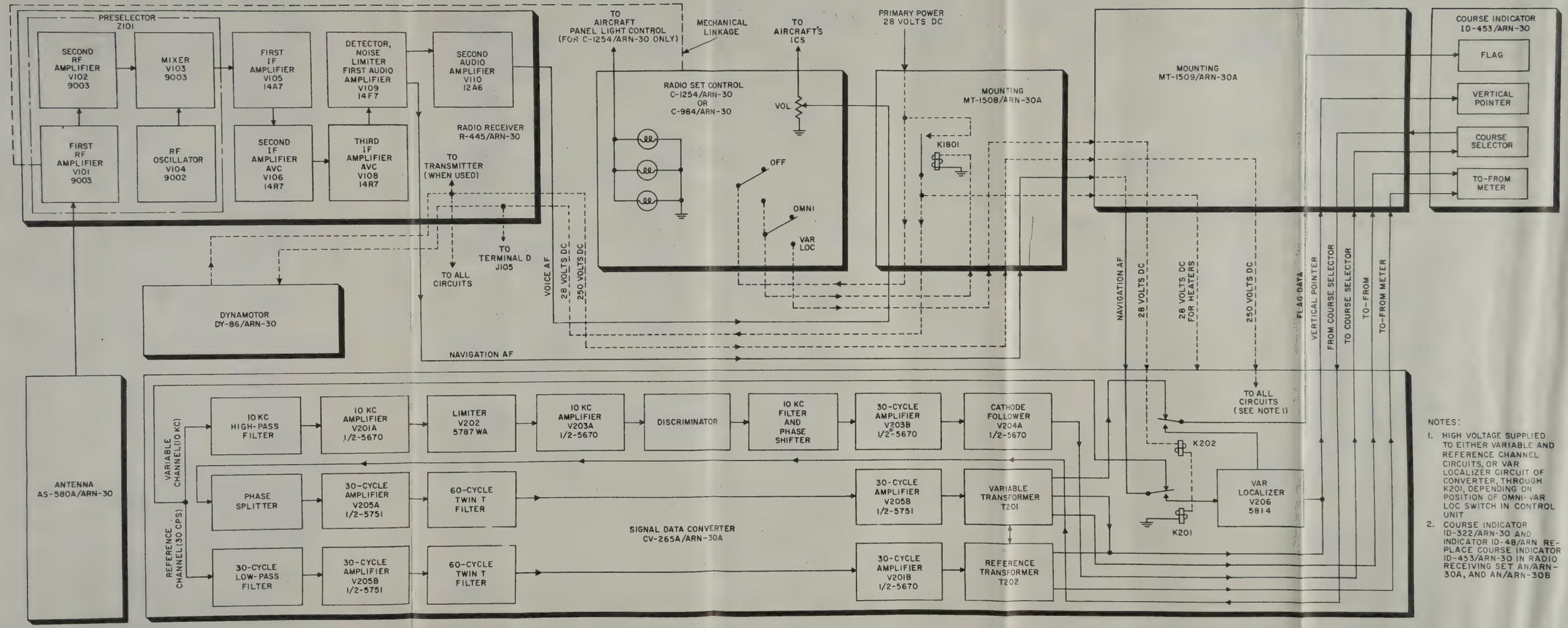


NOTES:
1. HIGH VOLTAGE SUPPLIED TO EITHER VARIABLE AND REFERENCE CHANNEL CIRCUITS, OR VAR LOCALIZER CIRCUIT OF CONVERTER, THROUGH K201, DEPENDING ON POSITION OF OMNI-VAR LOC SWITCH IN CONTROL UNIT.
2. COURSE INDICATOR ID-455/ARN-30 REPLACES INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 IN RADIO RECEIVING SET AN/ARN-30C.

Figure 4-21. One-Rack Installation, Detailed Block Diagram




SECOND
RF
AMPLIFIER
V102
9003
FIRST
RF
AMPLIFIER
V101
9003
ANTENNA
AS-580A/ARN-



NOTES:

1. HIGH VOLTAGE SUPPLIED TO EITHER VARIABLE AND REFERENCE CHANNEL CIRCUITS, OR VAR LOCALIZER CIRCUIT OF CONVERTER, THROUGH K201, DEPENDING ON POSITION OF OMNI-VAR LOC SWITCH IN CONTROL UNIT
2. COURSE INDICATOR ID-322/ARN-30 AND INDICATOR ID-48/ARN REPLACE COURSE INDICATOR ID-453/ARN-30 IN RADIO RECEIVING SET AN/ARN-30A, AND AN/ARN-30B

Figure 4-22. Two-Rack Installation, Detailed Block Diagram

AMPLIFIER
10 KC
FILTER

SECTION V

ORGANIZATIONAL AND OPERATIONAL MAINTENANCE

5-1. TEST POINT IDENTIFICATION SYMBOLS.

5-2. GENERAL. A system of test point identification symbols is incorporated in Section V and Section VI and is referenced on the complete schematic diagrams of the units in Section VII. The symbols are divided into three classes of test points: major, secondary, and minor. Test point identification symbols are assigned consecutively within each class and, once assigned, are not repeated for any other point.

5-3. MAJOR TEST POINTS. Major test points are used to identify and designate the test points used in checking the over-all functions of, and localizing trouble to, units, major assemblies, or groups of units. They are always identified on schematic diagrams by an arabic numeral enclosed in a star, and are referred to in the text as Test Point 1, Test Point 2, Test Point 3, etc.

5-4. SECONDARY TEST POINTS. Secondary test points are used to identify and designate the test points used in isolating causes of subnormal performance within a specific unit or assembly. They are always identified on schematic diagrams by a capital letter enclosed in a circle, and are referred to in the text as Test Point A, Test Point B, etc.

5-5. MINOR TEST POINTS. Minor test points are used to identify and designate the test points used in isolating causes of abnormal indications within a specific circuit of a unit. They are always identified on schematic diagrams by a capital letter and an arabic numeral subscript enclosed in a circle, and are referred to in the text as Test Point A1, Test Point A2, etc.

5-6. EQUIPMENT MINIMUM PERFORMANCE STANDARDS.

5-7. GENERAL. An over-all equipment performance check of the set requires the use of Radio Test Set AN/ARM-5 as a test signal source, if the equipment is being bench-tested or ramp-tested. It is also possible to make an in-flight performance test using the radiated signal of an omni station; however, this type of test may not be completely satisfactory. For bench-testing, the AN/ARM-5 output is connected to Test Point 1, J101, in place of the antenna. The other units of the set are connected as for normal operation. (See figure 5-1.) If the equipment is to be ramp-tested or flight-tested no special test set-up is required.

5-8. BENCH OR RAMP TESTING. If Radio Test Set AN/ARM-5 is available, check the performance of the set as outlined in table 5-1. If faulty operation is

TABLE 5-1. EQUIPMENT MINIMUM PERFORMANCE STANDARDS

Step	*AN/ARM-5 Control Positions*	*Radio Receiving Set Control Positions*	*Normal Indication*
1	POWER-OFF switch in POWER position. STANDBY-OPERATE switch in OPERATE position. Signal Generator SG-66/ARM-5 set up for testing as outlined in applicable operation handbook.	Turn OFF switch on. Allow equipment to warm up for three minutes. Set OMNI-VAR LOC switch to OMNI. Rotate tuning crank and tune receiver to AN/ARM-5 test signal.	Control unit frequency dial reading corresponds to AN/ARM-5 test signal frequency. If Radio Set Control C-1254/ARN-30 is in use and the aircraft panel light control is adjusted properly, panel lamps light, edge-lighting plastic front panel.

TABLE 5-1. EQUIPMENT MINIMUM PERFORMANCE STANDARDS (Cont)

Step	*AN/ARM-5 Control Positions*	*Radio Receiving Set Control Positions*	*Normal Indication*
2	FUNCTION switch in OMNI position. Set OMNI TRACK to "0".	Rotate COURSE SELECTOR knob for zero-degree setting.	Vertical pointer flag-alarm disappears and vertical pointer centers. TO-FROM meter indicates TO.
3	Same as step 2.	Slowly rotate COURSE SELECTOR knob in clockwise direction until vertical pointer swings full left (pointer over farthest left-hand dot), and note COURSE SELECTOR reading. Then rotate COURSE SELECTOR knob in counterclockwise direction until vertical pointer swings full right (pointer over farthest right-hand dot), and note COURSE SELECTOR reading.	Total COURSE SELECTOR degree-swing should be 20 degrees.
		Note Always make this check (course width) with the TO-FROM meter in the TO position. If check is made with FROM indication, opposite indications will result.	
4	Same as step 2.	Rotate COURSE SELECTOR knob for 180-degree setting.	Same as step 2 except that TO-FROM meter indicates FROM.
5	Set OMNI TRACK to each 60-degree "ANGLE TO" position around the dial.	Adjust COURSE SELECTOR for each 60-degree setting to correspond to settings of AN/ARM-5.	At each point vertical pointer flag-alarm disappears, vertical pointer centers, and TO-FROM meter indicates TO.
6	Set function switch to AMP LOC ↙ (needle left) position.	Set OMNI-VAR LOC switch to VAR LOC. Rotate tuning crank and tune receiver to AN/ARM-5 test signal frequency.	Vertical pointer flag-alarm disappears and vertical pointer swings left near the outer edge of the blue-colored arc.
7	Set function switch to AMP LOC ↓ (needle center) position.	Same as step 6.	Same as step 6 except vertical pointer centers.
8	Set function switch to AMP LOC ↘ (needle right) position.	Same as step 6.	Same as step 6 except vertical pointer swings to right to the outer edge of the yellow-colored arc.
9	Plug microphone into MIC jack and talk.	Rotate OFF control clockwise and counterclockwise meanwhile checking audio level and quality of voice transmission.	Audio level increases and decreases with control setting, quality remains good from minimum to maximum position.
10	Same as step 9.	Set OFF control full clockwise and strike the top of the receiver and converter sharply with the palm of the hand.	Microphonic noise is negligible, audio signal is not interrupted, noise resulting from blow is not appreciable.
11	Set POWER-OFF switch to OFF.	Turn OFF control full counterclockwise.	All power is disconnected from the equipment.

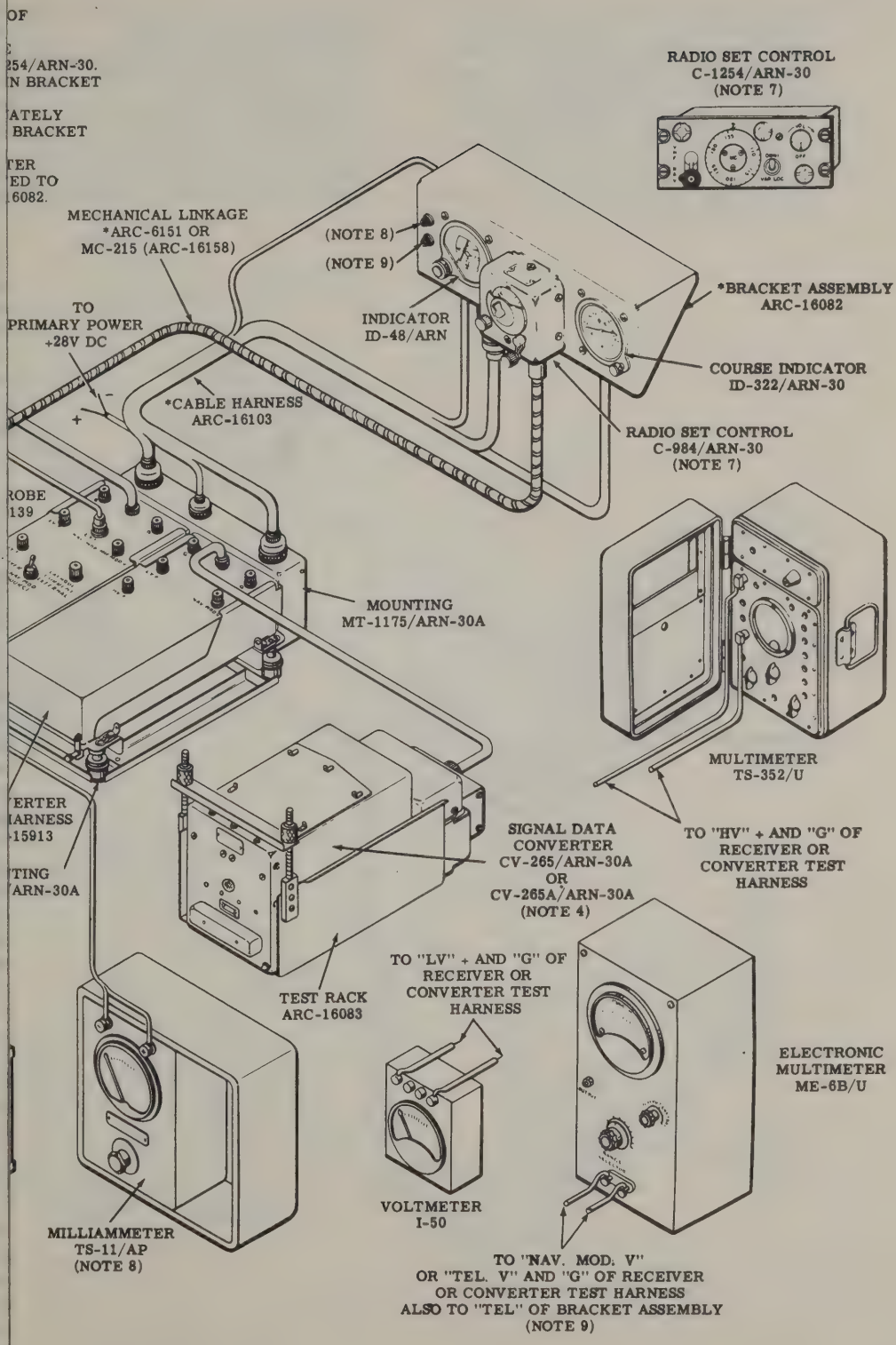


Figure 5-1. Bench Test, Interconnection Diagram

TABLE 5-1. EQUIPMENT MINIMUM PERFORMANCE STANDARDS (Cont)

Step	*AN/ARM-5 Control Positions*	*Radio Receiving Set Control Positions*	*Normal Indication*
2	FUNCTION switch in OMNI position. Set OMNI TRACK to "0".	Rotate COURSE SELECTOR knob for zero-degree setting.	Vertical pointer flag-alarm disappears and vertical pointer centers. TO-FROM meter indicates TO.
3	Same as step 2.	Slowly rotate COURSE SELECTOR knob in clockwise direction until vertical pointer swings full left (pointer over farthest left-hand dot), and note COURSE SELECTOR reading. Then rotate COURSE SELECTOR knob in counterclockwise direction until vertical pointer swings full right (pointer over farthest right-hand dot), and note COURSE SELECTOR reading.	Total COURSE SELECTOR degree-swing should be 20 degrees.
		Note Always make this check (course width) with the TO-FROM meter in the TO position. If check is made with FROM indication, opposite indications will result.	
4	Same as step 2.	Rotate COURSE SELECTOR knob for 180-degree setting.	Same as step 2 except that TO-FROM meter indicates FROM.
5	Set OMNI TRACK to each 60-degree "ANGLE TO" position around the dial.	Adjust COURSE SELECTOR for each 60-degree setting to correspond to settings of AN/ARM-5.	At each point vertical pointer flag-alarm disappears, vertical pointer centers, and TO-FROM meter indicates TO.
6	Set function switch to AMP LOC ↙ (needle left) position.	Set OMNI-VAR LOC switch to VAR LOC. Rotate tuning crank and tune receiver to AN/ARM-5 test signal frequency.	Vertical pointer flag-alarm disappears and vertical pointer swings left near the outer edge of the blue-colored arc.
7	Set function switch to AMP LOC ↓ (needle center) position.	Same as step 6.	Same as step 6 except vertical pointer centers.
8	Set function switch to AMP LOC ↘ (needle right) position.	Same as step 6.	Same as step 6 except vertical pointer swings to right to the outer edge of the yellow-colored arc.
9	Plug microphone into MIC jack and talk.	Rotate OFF control clockwise and counterclockwise meanwhile checking audio level and quality of voice transmission.	Audio level increases and decreases with control setting, quality remains good from minimum to maximum position.
10	Same as step 9.	Set OFF control full clockwise and strike the top of the receiver and converter sharply with the palm of the hand.	Microphonic noise is negligible, audio signal is not interrupted, noise resulting from blow is not appreciable.
11	Set POWER-OFF switch to OFF.	Turn OFF control full counterclockwise.	All power is disconnected from the equipment.

NOTES:

1. REFER TO TABLE 2-1 FOR COMPLETE LIST OF TEST EQUIPMENT.
2. CONNECT SIGNAL GENERATOR GROUND AS CLOSE AS POSSIBLE TO THE GROUND OF J102.
3. JUMPER IN CONNECTOR ARC-11934 (P101) MUST BE CONNECTED TO COMPLETE CIRCUIT.
4. UNITS CONVERTER SHOULD NOT BE CONNECTED DURING RECEIVER TESTS UNLESS OTHERWISE SPECIFIED, OR RECEIVER TEST HARNESS "NAV. MOD. SOURCE" SWITCH SHOULD BE SET AT "EXTERNAL."
5. UNITS PRECEDED BY AN ASTERISK (*) ARE PART OF BENCH TEST KIT ARC TYPE 15D.
6. SIGNAL GENERATOR SG-66/ARM-5 IS PART OF RADIO TEST SET AN/ARM-5.
7. RADIO SET CONTROL C-984/ARN-30 MAY BE SUBSTITUTED BY RADIO SET CONTROL C-1254/ARN-30. THIS COMPONENT CANNOT BE INSTALLED IN BRACKET ASSEMBLY ARC-16082.
8. MILLIAMMETER TS-11/AP MAY BE ALTERNATELY CONNECTED TO "TUNING METER" JACK ON BRACKET ASSEMBLY ARC-16082 - USE 1 MA SCALE.
9. HEADSET HS-33 OR ELECTRONIC MULTIMETER ME-6B/U MAY BE ALTERNATELY CONNECTED TO "TEL" JACK ON BRACKET ASSEMBLY ARC-16082.

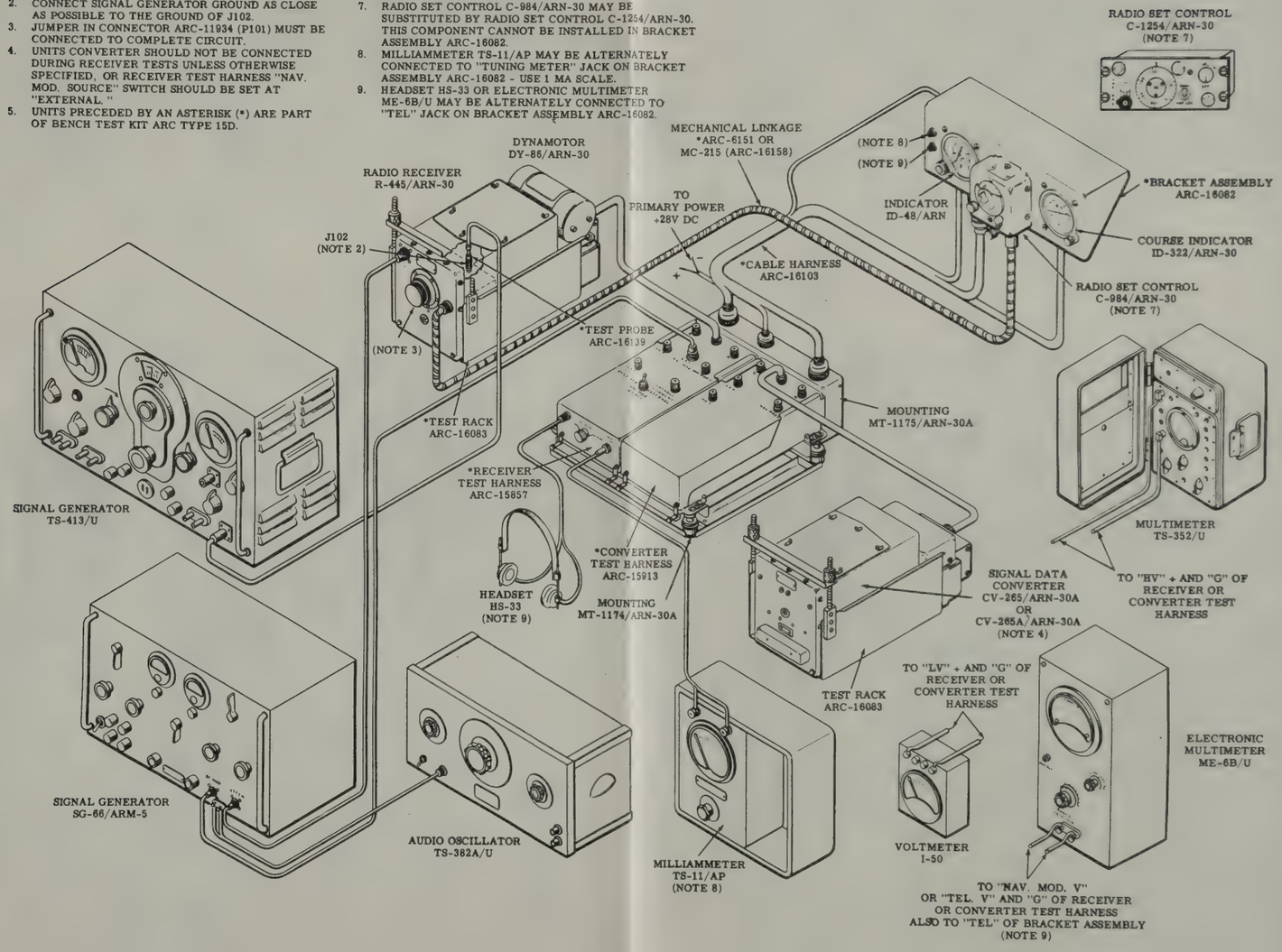

RADIO SET CONTROL C-1254/ARN-30 (NOTE 7)
DYNAMOTOR DY-86/ARN-30
RADIO RECEIVER R-445/ARN-30
MECHANICAL LINKAGE *ARC-6151 OR MC-215 (ARC-16158)
(NOTE 8)
(NOTE 9)
*BRACKET ASSEMBLY ARC-16082
INDICATOR ID-48/ARN
COURSE INDICATOR ID-322/ARN-30
TO PRIMARY POWER +28V DC
J102 (NOTE 2)
*CABLE HARNESS ARC-16103
RADIO SET CONTROL C-984/ARN-30 (NOTE 7)
(NOTE 3)
*TEST PROBE ARC-16139
MOUNTING MT-1175/ARN-30A
*TEST RACK ARC-16083
*RECEIVER TEST HARNESS ARC-15857
MULTIMETER TS-352/U
SIGNAL GENERATOR TS-413/U
*CONVERTER TEST HARNESS ARC-15913
SIGNAL DATA CONVERTER CV-265/ARN-30A OR CV-265A/ARN-30A (NOTE 4)
TO "HV" + AND "G" OF RECEIVER OR CONVERTER TEST HARNESS
HEADSET HS-33 (NOTE 9)
MOUNTING MT-1174/ARN-30A
TO "LV" + AND "G" OF RECEIVER OR CONVERTER TEST HARNESS
TEST RACK ARC-16083
ELECTRONIC MULTIMETER ME-6B/U
SIGNAL GENERATOR SG-66/ARM-5
AUDIO OSCILLATOR TS-382A/U
VOLTMETER I-50
MILLIAMMETER TS-11/AP (NOTE 8)
TO "NAV. MOD. V" OR "TEL. V" AND "G" OF RECEIVER OR CONVERTER TEST HARNESS ALSO TO "TEL" OF BRACKET ASSEMBLY (NOTE 9)

Figure 5-1. Bench Test, Interconnection Diagram

encountered, refer to paragraph 5-11. The test procedure as outlined in table 5-1 assumes that the equipment is being bench-tested. The procedure for ramp-testing is similar except that there is no direct connection between the AN/ARM-5 and the receiver; all test signals, including the AN/ARM-5 operator's announcements regarding test positions, are radiated. Note that the panel designation on Radio Set Control C-984/ARN is OFF and that it has a tuning crank, while the panel designation on Radio Set Control C-1254/ARN-30 is VOL-OFF and that it has a tuning knob. There is no functional difference.

5-9. FLIGHT TESTING. If Radio Test Set AN/ARM-5 is not available, an in-flight equipment performance check may be made. Indications obtained during such a test should compare favorably with the normal indications noted in table 5-1, and with those noted in the operating procedures in Section II of AN 16-30ARN30-1, "Handbook Operation Instructions Radio Receiving Set AN/ARN-30A, AN/ARN-30B, and AN/ARN-30C"; these procedures should be used when making the flight test. A flight test for VOR reception might include flying a straight track toward and over an omni-range station from a point 75 miles out, at an altitude of approximately 6000 feet. This will check the sensitivity, course-indication steadiness, and the operation of the TO-FROM meter. The course sensitivity may be checked during the flight by noting the number of degrees shift in the COURSE SELECTOR that is required for full swing of the vertical pointer from the last dot on the left to the last dot on the right. This should be 20 degrees. Note the bearing for several known locations. Check these against the chart, remembering the COURSE SELECTOR reads magnetic bearing. Note the movement of the TO-FROM meter while approaching, and passing over a station. It should read TO while approaching, and FROM when the station has been passed. In a limited region above the station (the "cone of confusion") the readings of both the vertical pointer and the TO-FROM meter will be erratic. Note that when flying on-course toward the station with the TO-FROM meter in TO, a movement of the vertical pointer to the right or left requires steering right or left respectively to get back on the course. This same steering rule follows in flying away from the station on-course with the TO-FROM meter in the FROM sector. A distance check should show normal operation for at least 75 miles, at approximately 6000 feet altitude. A flight check of VAR operation should be made on a VAR airways range. A flight check on a 90—150-cycle runway localizer should be made for accuracy and range, and to make certain that a motion of the vertical pointer to the left or right requires steering left or right respectively to get back on course. An on-course indication should lead the aircraft right down the center line of the runway. The course is necessarily very "tight" on localizer approach, in order to ensure positional accuracy; pilots should become accustomed to this condition before complaining of the "tightness" of the course.

5-10. SYSTEM TROUBLE ANALYSIS.

5-11. The units of the set are designed and factory-adjusted to be individually interchangeable; any unit of the equipment may be replaced by a similar type unit without upsetting the over-all calibration of the set. Therefore, during a performance check of the equipment it is practical to localize a faulty component by substituting, one at a time, the units of a "standard" set. Before substituting units, make the following checks:

a. Check the primary power source. The set requires 2.8 amperes at 28 volts dc.

b. Check the mechanical linkage in use. It should be reasonably straight and in good condition.

c. Check the condition of all cables.

d. Check all cable connections. (See figure 7-17 or 7-18.)

e. Check the frequency dial setting of the control unit with relation to the receiver tuning. If readjustment is required, refer to paragraph 3-16.

f. Remove the top covers of the receiver and converter. Remove the electron tubes, one at a time, and test in Tube Tester I-177-A.

CAUTION

Replace all tubes which test "good" in the same socket from which they were removed. If either V103 or V104 of the receiver is replaced, C102H must be readjusted. (Refer to paragraph 6-17.)

5-12. MINOR REPAIR AND ADJUSTMENT.

5-13. REPLACEMENT OF ELECTRON TUBES. Only the receiver and converter contain electron tubes. Receiver tubes and tubes in Signal Data Converter CV-265/ARN-30A can be reached by removing the top cover plate. In Signal Data Converter CV-265A/ARN-30A the entire cover must be removed for access to the tubes. (See figures 5-2, 5-3, and 5-4.)

CAUTION

If either V103 or V104 is replaced, C102H must be readjusted. (Refer to paragraph 6-17.)

5-14. REPLACING PANEL LAMPS. Radio Set Control C-1254/ARN-30 contains three GE type 327 midget flange-base panel lamps, installed in lamp sockets located on the front panel. To replace any one of these lamps, proceed as follows:

a. Unscrew the lamp housing assembly, and remove it together with the rubber lens cap and lamp.

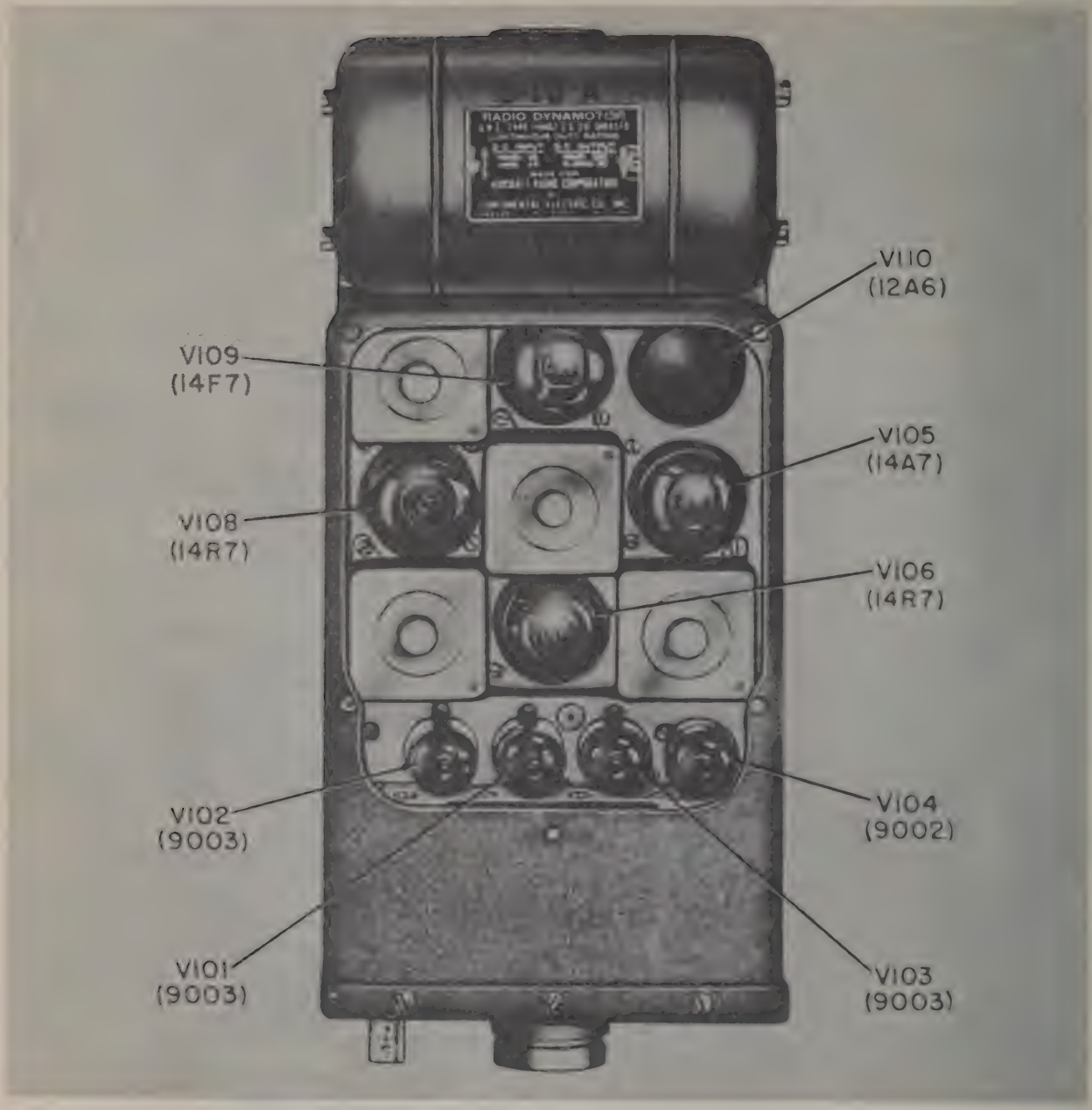


Figure 5-2. Radio Receiver R-445/ARN-30, Location of Electron Tubes

b. With the thin edge of a knife-blade (or the fingernails of the thumb and middle finger) inserted between the flange base of the lamp and threaded bushing, withdraw the defective lamp.

c. Insert a new lamp, seating the flange of the base firmly against the threaded bushing.

d. Replace the lamp housing assembly, and screw in finger-tight.

5-15. REPLACING GERMANIUM CRYSTAL DIODES. The converter contains ten germanium crystal diodes, located on the top of the chassis under the rear protective cover. These crystals are soldered in position, and no special procedures are required for their replacement; when soldering, take care to avoid overheating the crystal. Use a heat shunt between the crystal and the soldering point.

5-16. REFORMING ELECTROLYTIC CAPACITORS. Whenever Mounting MT-1175/ARN-30A is serviced, or in any case every two years, the three 1000 uf electrolytic capacitors, C301, C302, and C303, should be re-

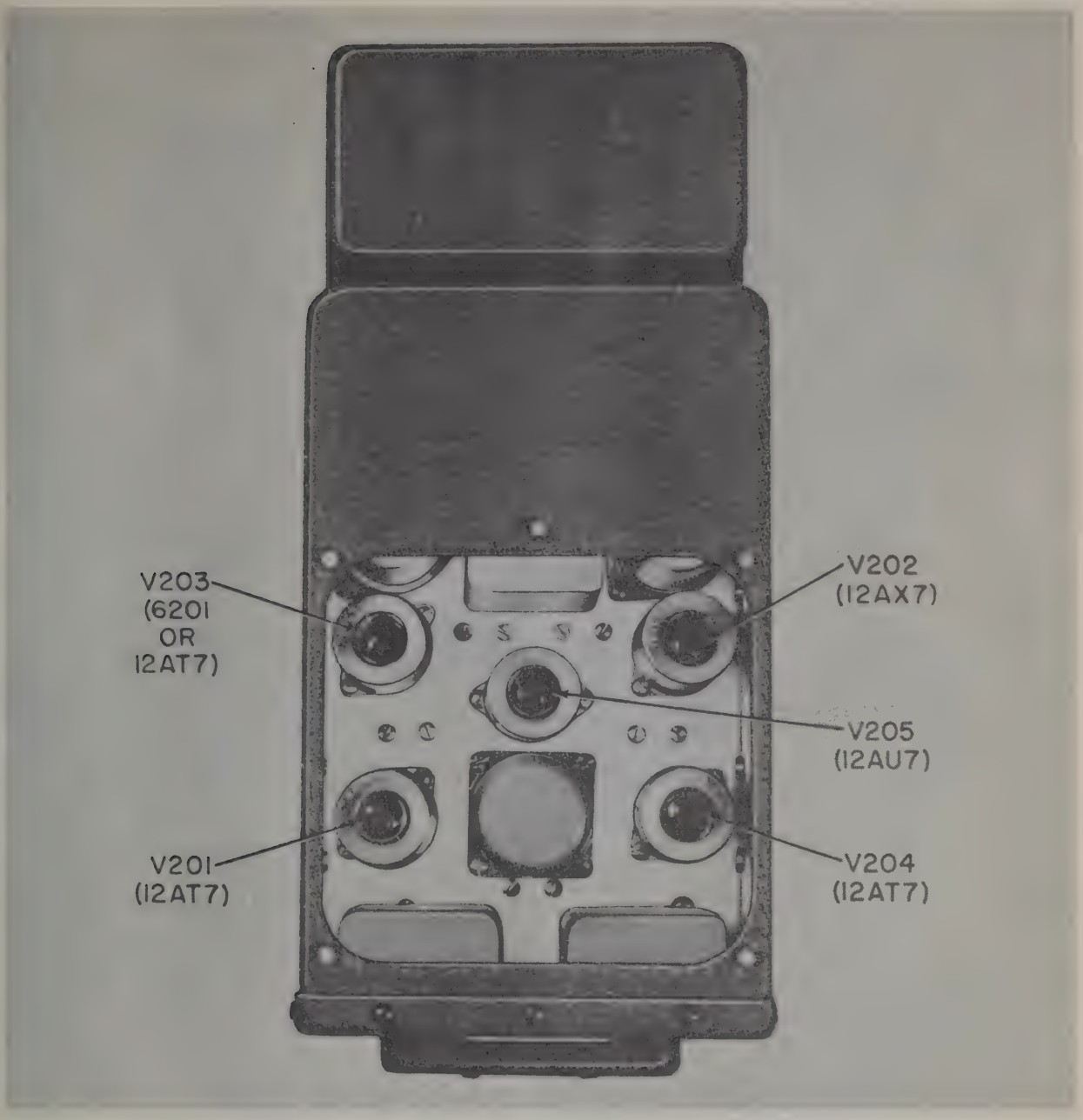


Figure 5-3. Signal Data Converter CV-265/ARN-30A, Location of Electron Tubes

formed at their rated voltage. To reform these capacitors proceed as follows:

a. Disconnect all interconnecting cables, and remove the receiver and converter from Mounting MT-1175/ARN-30A.

b. Remove the rear cover from the mounting. Unsolder and disconnect one end only of R301, R302, R303, and R304.

c. To reform the capacitors individually, connect a battery, having the rated voltage (within $\pm 10\%$) of the capacitor, through a current limiting resistor of about 22 ohms.

d. With the negative side of the battery connected to the negative terminal of the capacitor (not ground), connect the battery voltage across the capacitor for a period of at least 10 minutes.

e. To reform all three capacitors simultaneously, connect a current limiting resistor of about 22 ohms in

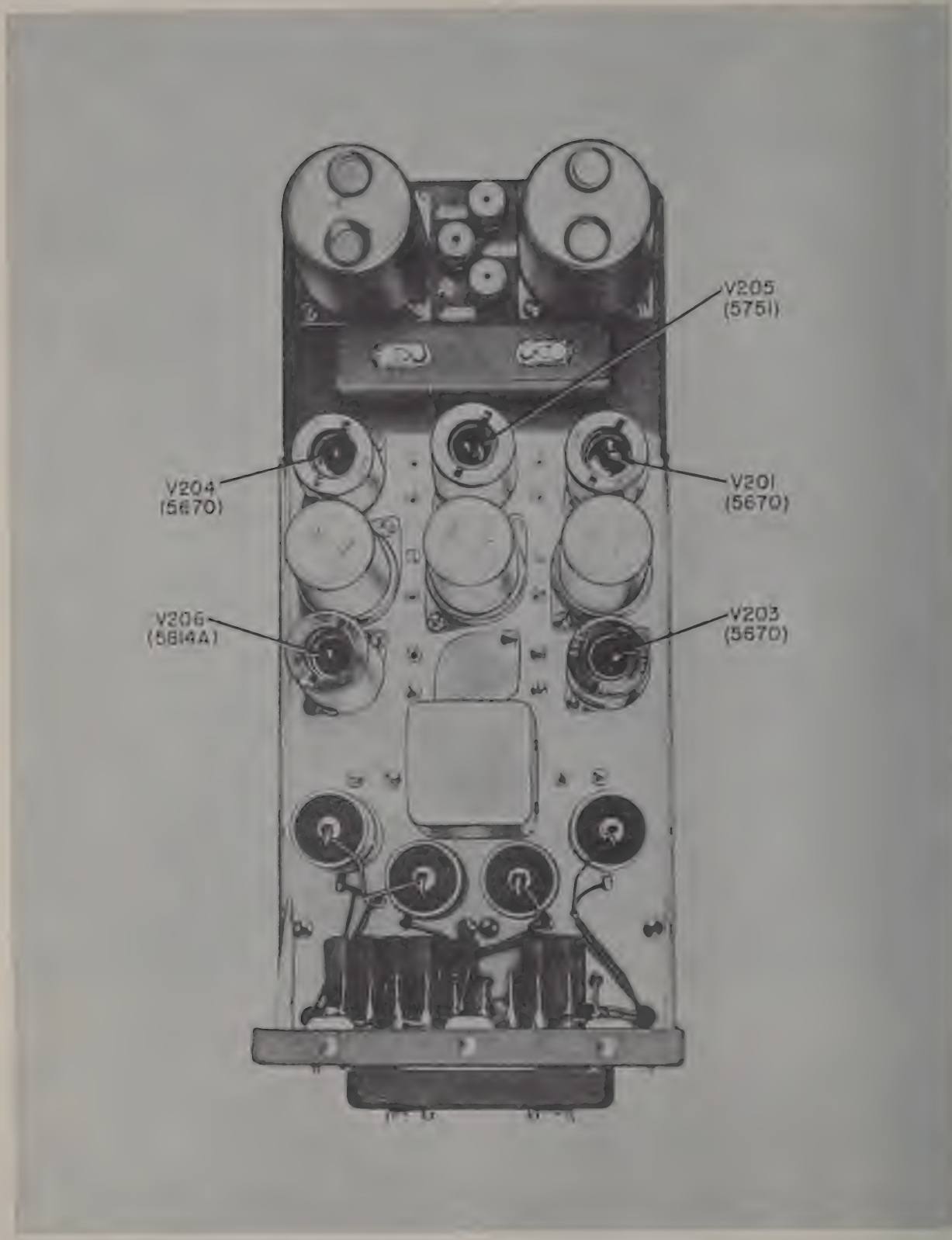


Figure 5-4. Signal Data Converter CV-265A/ARN-30A, Location of Electron Tubes

series with each capacitor, and follow the procedure of steps c. and d. of this paragraph.

f. After reforming the capacitors, discharge each capacitor by shorting it for a few minutes before reconnecting the equipment. This is to avoid damage to the instruments, which might result from discharging the capacitors through them.

g. Reconnect the resistors and replace the back cover.

5-17. A similar procedure is required at the same intervals for Mounting MT-1508/ARN-30A and MT-1509/ARN-30A. Proceed as follows:

a. For Mounting MT-1508/ARN-30A, remove the receiver and all the harness connectors.

b. Remove the back cover plate.

c. Disconnect one side of capacitor C1801.

d. Proceed as in steps c., d., and f. of paragraph 5-16.

e. Reconnect the capacitor and replace the cover plate.

f. For Mounting MT-1509/ARN-30A, remove the converter and the harness connectors.

g. Remove back cover plate.

h. Disconnect one side of the capacitors C1701 and C1702.

i. Proceed as in steps c., d., and f. of paragraph 5-16.

j. Restore the wiring of the capacitors and replace the back cover plate and the connectors.

5-18. LUBRICATION.

5-19. LUBRICATION OF CONTROL UNITS. The spur gears and bevel gears of Radio Set Control C-984/ARN-30 should be lubricated at points indicated in figure 5-5. Lubricating points for Radio Set Control C-1254/ARN-30 are given in figure 5-6.

5-20. LUBRICATION OF MECHANICAL LINKAGE. Lubrication of the mechanical linkage is performed during assembly, as described in step k. of paragraph 3-10. No further lubrication is usually necessary.

CAUTION

Do not apply grease of any kind to the mechanical linkage assembly.

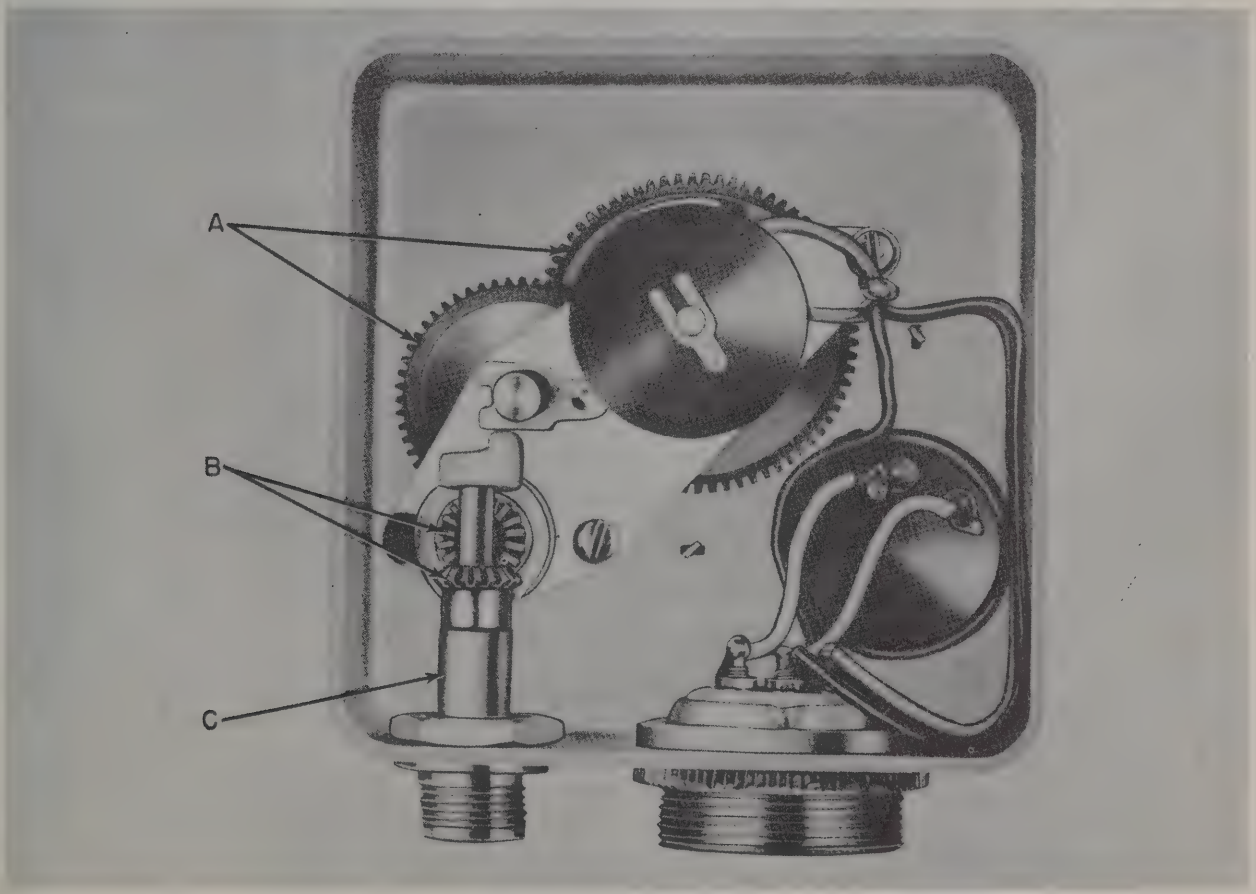


Figure 5-5. Lubricating Points for Radio Set Control C-984/ARN-30

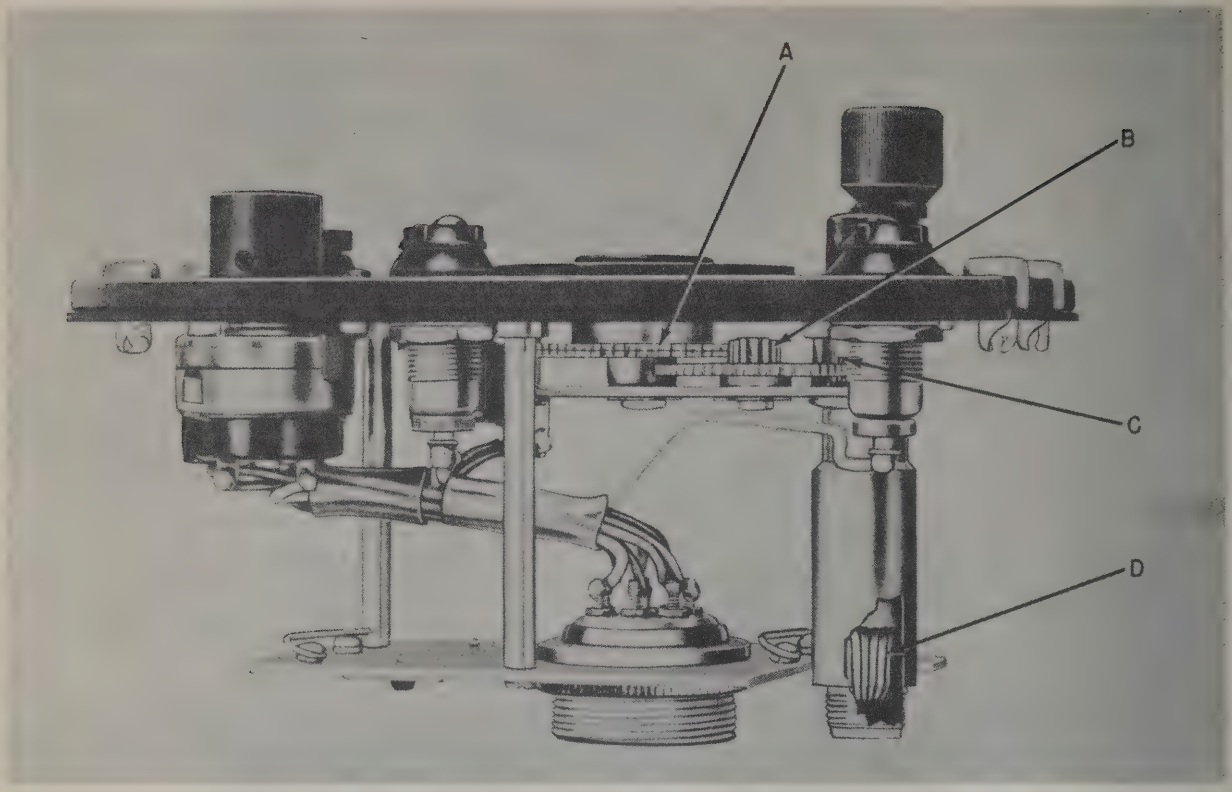


Figure 5-6. Lubricating Points for Radio Set Control C-1254/ARN-30

5-21. INSPECTION SCHEDULE.

5-22. Unit items requiring regular inspection, and the conditions to be checked, are listed in table 5-2.

TABLE 5-2. INSPECTION SCHEDULE

Unit	*Inspection*	*Time*
Antenna	Antenna Unit: Firmly secured to pedestal. Rubber mounting block not cracked or deteriorated. Antenna rods not deformed, not corroded, and mechanically secure in mounting block.	100 hrs
	Pedestal: Not bent. No enlarged mounting holes.	100 hrs
	Connectors: Mechanically secure. Not dirty.	100 hrs
Receiver	Exterior: All surfaces free from dust, dirt, or grease. Painted surfaces not marred. Snapslide studs mechanically secure. No severe dents. Front panel studs secure.	100 hrs
	Top Cover: Snapslides mechanically secure; slides operate freely and within channel. Undersurface felt not loose or torn. Location diagram lettering legible.	100 hrs
	Bottom Cover: Mounting studs mechanically secure; no stripped or worn threads. Location diagram lettering legible.	100 hrs

TABLE 5-2. INSPECTION SCHEDULE (Cont)

Unit	*Inspection*	*Time*
Receiver (Cont)	Electron Tubes: Envelopes not cracked, broken or loose. No bent or corroded terminal pins. No cracked tube bases. Test "good".	50 hrs
	I-f Transformers: Mechanically secure. Top caps in place and secure.	100 hrs
	Connectors and Sockets: Mounted securely. No stripped or worn threads. Terminals and pin connections secure and free from corrosion. Connector plug P101 connected to J105; cover cap in place and secure.	50 hrs
	Terminal Boards: Not broken, cracked, or chipped. Mounted securely.	100 hrs
	Wiring: All soldered connections mechanically and electrically secure and not corroded. No frayed or stripped insulation. Tubing enclosing wires not broken or deteriorated.	100 hrs
	Dynamotor Vibration Mounts: Mechanically secure. Rubber shock mounts not deteriorated or broken.	50 hrs
Signal Data Converter CV-265/ARN-30A CV-265A/ARN-30A	Exterior: All surfaces free from dust, dirt, or grease. Painted surfaces not marred. Snapslide studs mechanically secure. Front panel studs secure. No severe dents.	100 hrs
	Top Cover: Snapslides mechanically secure; slides operate freely and within channel. Undersurface felt not loose or torn.	100 hrs
	Front and Rear Covers: No severe dents. No enlarged mounting holes. Mechanically secure.	100 hrs
	Bottom Cover: Mounting studs mechanically secure; no stripped or worn threads. Location diagram lettering legible.	100 hrs
	Electron Tubes: Envelopes not cracked, broken, or loose. No bent or corroded terminal pins. Tube shields not dented or loose. Test "good".	50 hrs
	Connectors and Sockets: Mounted securely. Terminal and pin connections secure and free from corrosion.	50 hrs
	Relays: Free from dust, dirt, and other foreign matter. Contacts not burned, pitted or corroded. All wire connections secure; insulation not frayed or worn. Relay securely mounted. Coil free from signs of overheating.	50 hrs
	Terminal Boards: Not broken, cracked, or chipped. Mounted securely.	100 hrs
	Wiring: All soldered connections mechanically and electrically secure, and not corroded. No frayed or stripped insulation. Tubing enclosing wires not broken or deteriorated.	100 hrs
Mounting MT-1175/ARN-30A MT-1508/ARN-30A MT-1509/ARN-30A	Exterior: All surfaces free from dust, dirt, and grease. Painted surfaces not marred. Snapslides fastened securely; slides operate freely and within channel. Mounting captive nuts and links secure; nut threads freely without binding.	100 hrs
	Channel Frames: Securely fastened to rear junction box. All rivets unbroken.	100 hrs
	Relay: Free from dust, dirt, and other foreign matter. Contacts not burned, pitted or corroded. All wire connections secure; insulation not frayed or worn. Relay securely mounted. Coil free from signs of overheating.	50 hrs
	Connectors: Mounted securely. No bent, broken, or corroded terminals.	50 hrs
	Wiring: soldered connections mechanically and electrically secure, and not corroded. No frayed or stripped insulation.	100 hrs

TABLE 5-2. INSPECTION SCHEDULE (Cont)

Unit	*Inspection*	*Time*
Mounting MT-1174/ARN-30A MT-1510/ARN-30A	Free from grease, grit, or dirt. Ground straps securely attached between shock mounts and frame. Shock mounts secure; rubber not deteriorated. No enlarged mounting holes. Frames not abnormally bent.	100 hrs
Dynamotor	End Covers: Securely attached.	100 hrs
	Base: Securely attached to dynamotor. Snapslides fastened securely; slides operate freely within channel. Connector mechanically secured; terminals clean. Mounting locating studs mechanically secure.	100 hrs
Radio Set Control C-984/ARN-30 C-1254/ARN-30	External: All surfaces free from dust, dirt, or grease.	100 hrs
	Connectors: Mounted securely. No stripped or worn threads. Terminals secure and not corroded.	50 hrs
	Knobs: No stripped threads in mounting holes. No binding when switched or rotated. All markings legible.	100 hrs
	Dial: No legible markings. No binding evident when rotated by turning crank knob.	50 hrs
	Cover: Mounting studs mechanically secure; no stripped or worn threads. Snapslide attached securely; slide operates freely within channel.	100 hrs
	Wiring: All soldered connections mechanically and electrically secure. No frayed or stripped insulation.	100 hrs
	Light Assemblies: (In C-1254/ARN-30 only.) Light cap not cracked. Rubber panel light grommet (light shade) not broken, torn, or deteriorated. Red filter securely attached to cap, not cracked or broken. Lamp not broken or otherwise defective, held securely within threaded bushing. Threads of bushing not stripped or worn. Light assembly body not broken or cracked; internal threads not stripped or worn. Electrical connections and internal contact secure and not corroded.	100 hrs
Mounting MT-1046/ARN-30	General: Not deformed; snapslide stud secure; tension disc secured to plate; free from dust, dirt, or grease.	100 hrs
Course Indicator ID-322/ARN-30 ID-453/ARN-30	Exterior: All surfaces free from dust, dirt, or grease. Meter glass not cracked or broken.	100 hrs
	Knob: Mounting hole threads not stripped or broken. No evidence of binding when rotated, and pointer follows rotation without binding.	100 hrs
	Connector: Mechanically secure. Terminals clean and secure.	100 hrs
Indicator ID-48/ARN	Exterior: All surfaces free from dust, dirt, or grease. Meter glass not cracked or broken.	100 hrs
	Connectors: Mechanically secure. Terminals clean and secure.	100 hrs

SECTION VI

FIELD AND FASRON MAINTENANCE

6-1. GENERAL.

6-2. This section includes detailed performance standards and trouble analysis charts, and alinement and adjustment procedures for Radio Receiver R-445/ARN-30 and Signal Data Converter CV-265/ARN-30A and CV-265A/ARN-30A. Performance standards for Mounting MT-1175/ARN-30A, MT-1508/ARN-30A, or MT-1509/ARN-30A; Radio Set Control C-984/ARN-30, or C-1254/ARN-30; Course Indicator ID-322/ARN-30, or ID-453/ARN-30; and Indicator ID-48/ARN can best be checked by substituting them in a "standard" set and following the procedure outlined in table 5-1. Mounting MT-1175/ARN-30A, MT-1508/ARN-30A, MT-1509/ARN-30A, and Radio Set Control C-984/ARN-30 and C-1254/ARN-30 can be tested for defective circuits with standard maintenance procedures. If any defective circuits exist the indicator requires adjustment or repair; it should be forwarded to an overhaul depot.

6-3. The procedures outlined assume the use of a "standard" set in which the unit under test is substituted for the "standard" unit. To supplement the use of the maintenance information in this section, reference should be made to the schematic, wiring, voltage and resistance, and cabling diagrams of Section VII. A detailed listing of these diagrams is included at the beginning of Section VII.

6-4. TEST EQUIPMENT REQUIRED. The maintenance procedures require the use of Radio Test Set AN/ARM-5, Bench Test Kit ARC Type 15D or Bench Test Kit ARC Type 15C with Converter Test Harness ARC-15913 and Cable Harness Assembly ARC-16103, and the other standard test equipment listed in table 2-1. Instructions for the proper use of this test equipment for testing the units and diagnosing trouble are given; however, preliminary set-ups or operating instructions are not included since such information is contained in the applicable Operation Instructions Handbook.

6-5. RADIO RECEIVER R-445/ARN-30 PERFORMANCE STANDARDS AND TROUBLE ANALYSIS.

6-6. PERFORMANCE AND TROUBLE ANALYSIS CHECK CHART. Table 6-1 describes and lists the procedures for checking and analyzing the performance of the receiver. The circuit under test is identified by a subtitle preceding the test. Secondary steps marked, for example, 5A, 5B, 6C, 6D, etc. need not be performed unless an abnormal indication is obtained in the basic steps, and further testing is required to localize the trouble. See figures 7-1, 7-2, or 7-3 for test point locations, figure 7-4 for the wiring diagram, and figure 7-14 for the voltage and resistance diagram.

6-7. EFFECTS OF RADIO RECEIVER PHASE SHIFT. The phase of the 30-cycle navigation output from the receiver leads the phase of the input modulation envelope by 192 degrees when the navigation output line is open-circuited. (The phase difference is 189 degrees when the navigation output is loaded by the converter input impedance.) This phase shift results from the detector-noise limiter circuits of the receiver, and is carefully adjusted during manufacture by proper choice of the value of R141 in relationship to the detail parts of Z105, the fourth i-f coupling unit, and the "A" and "B" sections of C153. Since the precision of this factory adjustment is greater than that which can readily be achieved in the field, it is recommended that no field adjustments be made. The critical parts which determine this phase are Z105, C153B, C153C, and R141. If any of these parts are changed, the receiver should be returned to an overhaul depot (or to the factory) for precise readjustment. A defective detector-noise limiter tube, V109, may also cause a phase shift.

6-8. Improper phase shift may also result if the receiver has defective parts other than the critical ones mentioned in paragraph 6-7, but these will produce abnormal effects which will be noted under normal tests, such as described in table 6-1. In particular, the navigation output voltage must be within limits and the

avc must be operating properly. Significant phase errors in the receiver may be detected by the substitution of a "standard" receiver in the system and noting any change in course, or by noting the over-all error in the system after the other components have been checked.

6-9. When the converter is fed directly from the DEMOD output of Signal Generator SG-66/ARM-5 during course accuracy checks, "on-course" indications should be obtained when the COURSE SELECTOR reading is 192 degrees greater than the SG-66/ARM-5 OMNI TRACK angle, at an omni track of 0 degree, an "on-course" indication should correspond to a COURSE SELECTOR reading of 192 degrees TO; at a 300-degree track angle, an "on-course" indication should be obtained at 132 degrees (492-360), and similarly for other courses. The reason for this is that the open-circuit phase of the SG-66/ARM-5 DEMOD output is 192 degrees behind the corresponding receiver output phase. The COURSE SELECTOR must therefore be rotated so as to advance the phase by 192 degrees in the converter. (Refer to paragraph 6-7.) The *open circuit* phase of the SG-66/ARM-5 DEMOD output is the same as the phase of the modulation on the r-f output; moreover, the output impedance of the SG-66/ARM-5 DEMOD output is the same as the output impedance of the receiver navigation output circuit. Consequently, the phase shift (approximately 3-degree lag) caused by loading either the receiver or the SG-66/ARM-5 DEMOD output by the converter input impedance is the same, and need not be considered during course accuracy measurements of the converter. For these reasons, a perfect converter should produce "on-course" indications whenever the course indicator TO reading is 192 degrees greater than the setting of the SG-66/ARM-5 OMNI TRACK switch, or when the course indicator FROM reading is 12 degrees greater.

TABLE 6-1. RADIO RECEIVER R-445/ARN-30 PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
		LOW AND HIGH VOLTAGE TESTS		
1	None	Interconnect "standard" set, substituting the receiver undergoing test for the "standard", and required test equipment as shown in figure 5-1. (Unconnected test equipment shown in figure 5-1 is to be connected as directed in this procedure.)	None	None
2	None	Connect Voltmeter I-50 (30-volt range) to LV+ and G of receiver test harness. Turn on primary power source. Turn control unit OFF control clockwise. Allow set to warm up for at least 15 minutes.	Voltmeter reads 28 volts. Dynamotor operates. Electron tube filaments light.	Connector J103 (terminals 6 and 1). Coil L110. Capacitor C131C. Connector J104 (terminals 2 and 1). Defective electron tubes.
3	None	Connect Multimeter TS-352/U (500-volt d-c range) to HV+ and G of Receiver Test Harness.	Meter reads 253 volts.	Connector P101 at J105 missing or defective. Connector J103 (terminals 7 and 1). High-voltage circuits details; proceed with steps 3A, 3B, and 3C.
3A	Test Point (A_1), terminal A of J105, and Test Point (A_2), terminal C of J105.	Disconnect P101 from J105. Connect TS-352/U (500-volt d-c range) to receiver test points.	Meter reads 277 volts; if normal, proceed to step 3B.	Capacitor C131B or C135. Connector J104 (terminals 3 and 1). Connector J105 (terminals A and C).
3B	Test Point (A_3), terminal E of J105 and Test Point (A_2), terminal C of J105.	Reconnect P101 to J105. Connect TS-352/U (500-volt d-c range to receiver test points.	Meter reads 253 volts.	Proceed to step 3C; if reading of step 3C is normal, L112 defective; otherwise, check possible causes of step 3C.

TABLE 6-1. RADIO RECEIVER R-445/ARN-30 PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
3C	Test Point (A4), terminal 2 of L112 and chassis ground	Same as step 3B.	Meter reads 277 volts.	Connector J105 (terminal E). Decoupling capacitors such as C140, C142, C153A, C130A, etc. in high-voltage circuit.
		CALIBRATION CHECK		
4	Test Point (1), J101	Adjust control unit frequency dial in relation to receiver tuning capacitor (paragraph 3-16). Install 131-mc and 111-mc crystal in Signal Generator SG-66/ARM-5. Connect SG-66/ARM-5 ATTEN output to receiver test point. Turn receiver test harness RF SENS control to MAX position. Operate SG-66/ARM-5 as outlined in applicable instructions, adjusting OUTPUT ATTENUATOR for low-level input to receiver. Tune receiver to 131-mc signal from SG-66/ARM-5, tuning for maximum audio output.	Control unit dial reading is no more than one line-width in error. Audio output is audible and undistorted.	Defective electron tubes. Local oscillator misalined; realine C102H (paragraph 6-17).
		Tune receiver to 111-mc signal from SG-66/ARM-5, tuning for maximum audio output.	Control unit dial reading error is no more than two line-widths.	Receiver misalined (paragraphs 6-14 through 6-17).
		R-F SENSITIVITY		
5	None	Connect DEMOD output of SG-66/ARM-5 to EXT NAV MOD of receiver test harness. Connect Audio Oscillator TS-382A/U to EXT MOD binding posts of SG-66/ARM-5. Tune receiver to 131-mc signal modulated 30% at 400 cps, derived from SG-66/ARM-5 and TS-382/U. With Electronic Multimeter ME-6B/U connected to TEL and G test points of the receiver test harness, adjust r-f output of SG-66/ARM-5 to obtain reading of 1.73 audio output volts on ME-6B/U with receiver tuned accurately for maximum output.	Required r-f input to receiver is less than 5 microvolts as observed on SG-66/ARM-5 OUTPUT ATTENUATOR. (If normal, proceed with step 6, if desired, or to step 7.)	If required r-f input is substantially more than 5 microvolts, localize trouble to either r-f section by proceeding with steps 5A through 5H, as required, or to i-f and audio section by proceeding with steps 6, and 6A through 6M, as required.
5A	Same as step 5	Increase r-f input to 10,000 microvolts, and rotate receiver test harness RF SENS control to MIN.	Audio output can be substantially cut off. If normal, proceed with step 6.	Proceed with steps 5B through 5H as required.
5B	Test Point (A17), pin 5 of V104	Connect Multimeter TS-352/U (250-volt d-c range) between test point and chassis ground.	Meter reads 215 volts.	Resistor R113. Capacitor C117.
5C	Test Point (A18), pin 5 of V102	Connect Multimeter TS-352/U (500-volt d-c range) between test point and chassis ground.	Meter reads 220 volts.	Resistor R111. Capacitor C112.
5D	Test Point (A19), pin 6 of V102	Same as step 5B.	Meter reads 88 volts.	Resistor R108.
5E	Test Point (A20), pin 7 of V102	Connect Multimeter TS-352/U (10-volt d-c range) between test point and chassis ground.	Meter reads 5.5 volts.	Resistor R104. Capacitor C109.

TABLE 6-1. RADIO RECEIVER R-445/ARN-30 PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
5F	Test Point (A21), pin 5 of V101	Same as step 5C.	Meter reads 214 volts.	Resistor R106. Capacitor C108. Coil L103.
5G	Test Point (A22), pin 6 of V101	Same as step 5B.	Meter reads 86 volts.	Resistor R105.
5H	Test Point (A23), pin 7 of V101	Same as step 5E.	Meter reads 5.2 volts.	Resistor R102. Capacitor C105.
		I-F SENSITIVITY AT MIXER (V103) GRID		
6	Test Point (A), J102	Connect Signal Generator TS-413/U through Test Probe ARC-16139 (part of bench test kit) to receiver test point. Tune TS-413/U to 15 mc modulated 30% at 400 cps supplied by TS-382A/U. Adjust input to receiver to a level low enough to prevent activating avc circuit. Connect Electronic Multimeter ME-6B/U to TEL V. test point of receiver test harness. Adjust output of the TS-413/U to obtain reading of 1.73 audio output volts on Electronic Multimeter ME-6B/U.	Required number of microvolts should lie between 120 and 400 for 1.73 reading on the ME-6B/U.	Tubes V103, V105, V106, V108. Detail parts of i-f circuits; make tests outlined in steps 6A through 6H. I-f circuits misalined (paragraph 6-16).
6A	Test Point (A5), pin 2 of V108	Connect Multimeter TS-352/U (500-volt d-c range) between test point and chassis ground.	Meter reads 240 volts.	I-f coupling unit Z105. Resistor R134.
6B	Test Point (A6), pin 7 of V108	Connect Multimeter TS-352/U (10-volt d-c range) between test point and chassis ground.	Meter reads 5.5 volts.	Resistor R135. Capacitor C144C.
6C	Test Point (A7), pin 5 of V108	Same as step 6A.	Meter reads 252 volts.	Resistor R139. Capacitor C147.
6D	Test Point (A8), pin 2 of V106	Same as step 6A.	Meter reads 243 volts.	I-f coupling unit Z104.
6E	Test Point (A9), pin 5 of V106	Connect Multimeter TS-352/U (250-volt d-c range) between test point and ground.	Meter reads 99 volts.	Resistors R127, R132, R133. Capacitors C131A, C137B.
6F	Test Point (A10), pin 7 of V106	Same as step 6B.	Meter reads 3.5 volts.	Resistor R123. Capacitor C136.
6G	Test Point (A11), pin 2 of V105	Same as step 6A.	Meter reads 237 volts.	I-f coupling unit Z103.
6H	Test Point (A12), pin 3 of V105	Same as step 6E.	Meter reads 98 volts.	Resistor R125. Capacitor C126.

TABLE 6-1. RADIO RECEIVER R-445/ARN-30 PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
6J	Test Point (A13), pin 7 of V105	Connect Multimeter TS-352/U (50-volt d-c range) between test point and chassis ground.	Meter reads 9.3 volts.	Resistor R118. Capacitor C125.
6K	Test Point (A14), pin 5 of V103	Same as step 6A.	Meter reads 236 volts.	I-f coupling unit Z102.
6L	Test Point (A15), pin 6 of V103	Same as step 6E.	Meter reads 175 volts.	Resistor R110. Capacitor C114.
6M	Test Point (A16), pin 2 of V103	Same as step 6J.	Meter reads 18 volts.	Resistor R109. Capacitor C113. Coil L105.
		AVC OPERATION CHECK		
7	Test Point (1), J101	Connect FM Signal Generator Type 202-B to test point, modulated 30% at 400 cps using Audio Oscillator TS-382A/U, and tuned to any frequency within the band (108-135 mc) of receiver. Connect Electronic Multimeter ME-6B/U to TEL V. and G test points of receiver test harness. Tune receiver for maximum audio output and measure audio output volts with ME-6B/U for input levels noted below. (Ratio of output at 10,000 microvolts r-f input to output at 100 microvolts r-f input is normally about 1.25. Input corresponding to avc knee is defined as that input which causes cathode current to decrease by 1 ma from its no-signal value.) (This input is normally about 8 microvolts.)		
		Input level at avc knee.	Meter reads 5 to 8.5 volts audio output.	Tubes V106, V107, V108. Other detail parts of avc circuit.
		Input level at 100 microvolts.	Meter reads 6.8 to 10 volts audio output.	
		Input level at 10,000 microvolts.	Meter reads 8 to 12 volts audio output.	
		NAVIGATIONAL AUDIO FIDELITY		
8	Test Point (1), J101	Connect Electronic Multimeter ME-6B/U to NAV MOD V. and G test points of receiver test harness. Connect FM Signal Generator 202-B to test point, modulated 30%, at an r-f level of 100 microvolts, and with modulating frequencies, derived from Audio Oscillator TS-382A/U, tabulated below:		
		Modulation frequency of 90 cps	Meter reads 1.7 to 3.0 volts.	Tubes V109, V110. Transformer T101. Capacitor C163. Detail parts of audio amplifier and output circuits.

TABLE 6-1. RADIO RECEIVER R-445/ARN-30 PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
8 (Cont)		Modulation frequency of 150 cps	Meter reads 1.7 to 3.0 (±3%) volts.	
		Modulation frequency of 30 cps	Meter reads 1.7 to 3.0 (±5%) volts.	
		Modulation frequency of 10,000 cps	Meter reads 1.7 to 3.0 (+0, −20%) volts.	
		TUNING METER OPERATION		
9	Test Point (B), terminal G, and Test Point (C), terminal D, of J304 in Mounting MT-1175/ARN-30A	Connect Milliammeter TS-11/AP (1-ma range) to test points. Tune receiver through an r-f signal from FM Signal Generator 202-B (modulated or unmodulated).	At receiver resonance, meter reading should pass through a peak; note this point.	
	None	Connect Electronic Multimeter ME-6B/U to either NAV MOD V. or TEL V. and G test points of receiver test harness. With modulated r-f signal applied, tune Radio Receiver through resonance.	ME-6B/U should indicate a peak at same tuning point.	
		OSCILLATOR STARTING SAFETY FACTOR		
10	Test Point (1), J101	Connect Voltmeter I-50 (30-volt range) to LV+ and G test points of receiver test harness. Connect Electronic Multimeter ME-6B/U to TEL V. and G test points. Tune receiver to signal from 202-B, at about 500-microvolt level. Gradually reduce d-c primary power voltage to receiver until abrupt disappearance of signal (as read on the ME-6B/U) indicates that local oscillator has stopped functioning. Wait 10 seconds. Slowly increase d-c primary power voltage until oscillator starts again.	ME-6B/U reading at point at which oscillator starts to operate again is not greater than 19 volts.	Tube V104. Other detail parts of oscillator circuit.

6-10. SIGNAL DATA CONVERTER CV-265/ARN-30A PERFORMANCE STANDARDS AND TROUBLE ANALYSIS.

6-11. Table 6-2 describes and lists the procedure for checking and analyzing the performance of Signal Data Converter CV-265/ARN-30A. The tests are subtitled to identify the circuit being checked. Secondary steps marked, for example, 5A, 5B, etc. need not be performed unless an abnormal indication obtained in the basic step requires further testing to localize the trouble. (See figure 7-1 or 7-2 for test point locations, figure 7-5 for the wiring diagram, and figure 7-15 for the voltage and resistance diagram.)

6-12. SIGNAL DATA CONVERTER CV-265A/ARN-30A PERFORMANCE STANDARDS AND TROUBLE ANALYSIS.

6-13. Table 6-3 describes and lists the procedure for checking and analyzing the performance of Signal Data Converter CV-265A/ARN-30A. Secondary steps marked, for example, 5A, 5B, etc, need not be performed unless an abnormal indication obtained in the basic step indicates further testing to locate the trouble. (See figure 7-3 for test point locations, figure 7-6 for the wiring diagram, and figure 7-16 for the voltage and resistance diagram.)

TABLE 6-2. SIGNAL DATA CONVERTER CV-265/ARN-30A PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indication*
		PRELIMINARY PROCEDURE		
1	None	Interconnect "standard" set equipment, substituting Signal Data Converter undergoing test for "standard", and required test equipment as shown in figure 5-1. (Unconnected test equipment shown in figure 5-1 is to be connected as directed in this procedure.)	None	None
2	None	Connect Voltmeter I-50 (30-volt range) to LV+ and G of converter test harness. Turn on primary power source. Turn control unit OFF control clockwise. Allow set to warm up for at least 15 minutes.	Voltmeter reads 28 volts. Electron tube filaments in converter light.	Connector J201. Defective electron tubes.
3	None	Connect Multimeter TS-352/U (500-volt d-c range) to HV+ and G test points of converter test harness. Adjust primary voltage input until TS-352/U reads 240 volts.	None	None
4	None	Connect Electronic Multimeter ME-6B/U (3-volt range) between NAV MOD V. and G test points of receiver test harness. Set NAV MOD SOURCE switch to EXTERNAL. Connect DEMOD output of Signal Generator SG-66/ARM-5 to EXT NAV MOD connector of receiver test harness. Set control unit OMNI-VAR LOC switch to OMNI. Operate and adjust SG-66/ARM-5 with level set indications of r-f level and individual 30-cycle and 9960-cycle modulations as described in the applicable handbook. Then, set SG-66/ARM-5 FUNCTION switch to 30~ MOD SET, and adjust its DEMOD output to obtain a NAV MOD V. reading of 1.8 volts on ME-6B/U. Then set FUNCTION switch to OMNI.	None	None
		OMNI TRACK COURSE ACCURACY CHECK		
5	None	Check accuracy of converter for each of 24 OMNI TRACK "angle TO" settings of SG-66/ARM-5; keep in mind that proper allowance must be made for effect of omitting receiver phase shifts from measurements. Refer to paragraphs 6-7 through 6-9 for general discussion of this.	Vertical pointer centers for each of SG-66/ARM-5 "angle TO" tracks, and flag-alarm is out of sight. Course indicator TO - FROM meter reads TO.	Connectors J201, J202. Flag circuit detail parts: CR207, CR208, R222, R224, R225, R226. TO-FROM meter circuit detail parts: CR205, CR206, R220, R221.
	Test Point (B_1), C202 (orange wire)	Connect Electronic Multimeter ME-6B/U (3-volt range) between test point and chassis ground.	Meter reads 2.0 volts.	Capacitor C202. Relay K201. Connector J201.
	Test Point (B_2), K201 (red wire)	Connect Multimeter TS-352/U (500-volt d-c range) between test point and chassis ground.	Meter reads 240 volts.	Capacitors C208A, C208B, C214A, C214B, C221, etc. Relay K201. Connector J201.

TABLE 6-2. SIGNAL DATA CONVERTER CV-265/ARN-30A PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
		VARIABLE CHANNEL TEST		
6	Test Point (F), J205 and Test Point (F), J204	Connect Electronic Multimeter ME-6B/U between test points.	Meter reads between 2.7 and 4.1 volts.	Tubes V204A, V204B, V202A, V203B. Variable channel detail parts; proceed with steps 6A through 6E, as required.
6A	Test Point (B_3), pin 2 of V204A	Connect ME-6B/U (3-volt range) between test point and chassis ground.	Meter reads 1.7 volts.	Detail parts of filter circuit.
6B	Test Point (B_4), pin 1 of V204A	Connect Multimeter TS-352/U (500-volt d-c range) between test point and chassis ground.	Meter reads 205 volts.	Resistor R231.
6C	Test Point (B_5), C213 (yellow wire)	Connect ME-6B/U (3-volt range) between test point and chassis ground.	Meter reads 1.0 volt.	Capacitor C213. Connector J201. Detail parts of phase splitting network.
6D	Test Point (B_6), pin 6 of V204B	Connect TS-352/U (250-volt d-c range) between test point and chassis ground.	Meter reads 145 volts.	Resistor R236. Capacitor C206C. Resistor R237.
		Connect ME-6B/U between test point and chassis ground.	Meter reads 3.0 volts.	
6E	Test Point (B_7), pin 1 of V203B	Connect ME-6B/U between test point and chassis ground.	Meter reads 45 volts.	Transformer T202. Resistors R241, R240. Capacitor C215.
		REFERENCE CHANNEL TEST		
7	Test Point (D), J203 and Test Point (E), J204	Connect Electronic Multimeter ME-6B/U between test points.	Meter reads between 2.7 and 4.1 volts.	Tubes V201A, V201B, V202A, V203A. Reference channel detail parts; proceed with steps 7A through 7E as required.
7A	Test Point (B_8), pin 1 of V201A	Connect Multimeter TS-352/U (250-volt d-c range) between test point and chassis ground.	Meter reads 75 volts.	Resistors R203, R202, R209. Capacitors C203, C201, C208B.
		Connect ME-6B/U between test point and chassis ground.	Meter reads 17 volts.	
7B	Test Point (B_9), R206 (dark blue wire)	Connect ME-6B/U between test point and chassis ground.	Meter reads 7.8 volts.	Crystals CR201, CR202. Resistor R204. Potentiometer R206.
	Test Point (B_{10}), R206 (green wire)		Meter reads 1.0 volt.	
7C	Test Point (B_{11}), pin 6 of V201B	Connect ME-6B/U between test point and chassis ground.	Meter reads 2.0 volts.	Discriminator transformer Z201. Resistor R208. Capacitor C204.

TABLE 6-2. SIGNAL DATA CONVERTER CV-265/ARN-30A PERFORMANCE STANDARDS AND TROUBLE ANALYSIS CHART (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indication*
7D	Test Point (B_{12}), pin 2 of V202A	Connect ME-6B/U between test point and chassis ground.	Meter reads 0.1 volt (100 millivolts).	Crystals CR203, CR204. Other detail parts of discriminator circuit.
7E	Test Point (B_{13}), pin 6 of V203A	Connect ME-6B/U between test point and chassis ground.	Meter reads 45 volts.	Transformer T201. Capacitor C207. Resistor R219. Associated detail parts of V202A and V203A.
		VAR LOC CIRCUIT TESTS		
8	None	Same as steps 1 through 4, except set control unit OMNI-VAR LOC switch to VAR LOC.	Same as steps 1 through 4.	Same as steps 1 through 4.
9	None	Set SG-66/ARM-5 FUNCTION switch to AMP LOC (needle center).	Vertical pointer centers. Flag-alarm out of sight. (If a 0-1 ma, 1000-ohm meter is used to replace flag movements, its reading should be between 0.3 and 0.45 ma for a "needle center" signal.)	Balance resistor R250 misadjusted; readjust to obtain "on-course" reading.
10	None	Set SG-66/ARM-5 FUNCTION switch to AMP LOC (needle left).	Vertical pointer swings left to outer edge of blue sector. Flag-alarm out of sight. (This corresponds to 90 microamperes in the meter movement. Indicator can be replaced by a 1000-ohm 150-0-150 microammeter, if desired.)	Sensitivity resistor R245 misadjusted; readjust to obtain proper "needle left" indication.
11	None	Set SG-66/ARM-5 FUNCTION switch to AMP LOC (needle right).	Vertical pointer swings right to outer edge of yellow sector within about a needle width (meter current should be 90 ± 5 microamperes). Flag-alarm out of sight.	If more than one needle width error, readjust sensitivity resistor R245 to split error in half between left and right sectors. If not possible to adjust R245 or R250 properly, detail parts of VAR LOC circuits may be faulty; proceed with steps 11A and 11B.
11A	Test Point (B_{14}), R245 (light blue wire)	Connect ME-6B/U between test point chassis ground.	Meter reads 4.5 volts.	Resistors R246, R245, R244. Capacitors C218, C219. Relay K201.
11B	Test Point (B_{15}), pin 6 of V205B	Connect ME-6B/U between test point and chassis ground.	Meter reads 27 volts.	Resistors R249, R248. Filters Z202, Z203.

TABLE 6-3. SIGNAL DATA CONVERTER CV-265A/ARN-30A PERFORMANCE TESTS AND TROUBLE ANALYSIS

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
		PRELIMINARY PROCEDURE		
1	None	Interconnect "standard" set substituting converter under test for "standard" converter, and required test equipment as shown in figure 5-1. (Unconnected test equipment shown in figure 5-1 is to be connected as directed in this procedure.)	None	None
2	None	Connect Voltmeter I-50 (30-volt range) to LV+ and G of converter test harness. Turn on primary power source. Turn control unit OFF control clockwise (on). Allow equipment to warm up for at least 15 minutes.	Meter reads 28 volts. Electron tube filaments light.	Connector J204. Defective electron tubes.
3	None	Connect Voltmeter I-50 (500-volt range) to HV+ and G test points of converter test harness. Adjust primary voltage input until voltmeter reads 240 volts.	None	None
4	None	Connect Electronic Multimeter ME-6B/U between NAV MOD V. and G test points of receiver test harness. Set receiver test harness NAV MOD SOURCE switch to EXTERNAL. Connect DEMOD output of Signal Generator SG-66/ARM-5 to EXT NAV MOD connector of receiver test harness. Set control unit OMNI-VAR LOC switch to OMNI. Operate and adjust SG-66/ARM-5 with level set indications of r-f level and individual 30-cycle and 9960-cycle modulations as described in applicable instruction book. Then, set signal generator function selector switch to 30~ modulation, and adjust its DEMOD output to obtain a NAV MOD V. reading of 1.8 volts on vtvm. Then, set signal generator function selector switch to OMNI.	None	None
		OMNI TRACK COURSE ACCURACY CHECK		
5	None	Check accuracy of converter for each of 24 OMNI TRACK ANGLE TO settings of SG-66/ARM-5 signal generator; proper allowance must be made for effect of omitting receiver phase shifts from measurements. (Refer to paragraphs 6-7, 6-8, and 6-9.)	Vertical pointer centers for each of "Angle TO" tracks, flag-alarm is out of sight, and TO-FROM meter indicates TO.	Connectors J204, J205. Flag circuit detail parts: CR207, CR208, R237, R238, R239, R240. TO-FROM meter circuit detail parts: CR205, CR206, R235, R236.
	Test Point (B_1)	Connect Electronic Multimeter ME-6B/U between test point and chassis ground.	Meter reads 2.3 volts.	Relay K201. Connector J204.
	Test Point (B_2)	Connect Voltmeter I-50 (500-volt range) between test points and chassis ground.	Meter reads 240 volts in each case.	Connector J204. Capacitor C219B. Relay K201. Capacitors C219A, C209A, C209B, C207A, C207B, and other high-voltage circuit detail parts.

TABLE 6-3. SIGNAL DATA CONVERTER CV-265A/ARN-30A PERFORMANCE TESTS AND TROUBLE ANALYSIS (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
		VARIABLE CHANNEL TEST		
6	Test Points (E) and (F)	Connect Electronic Multimeter ME-6B/U between test points.	Meter reads between 3.6 and 4.0 volts.	Tubes V205B, V201B. Variable channel detail parts proceed with steps 6A through 6D, as required.
6A	Test Point (B_3)	Connect Electronic Multimeter ME-6B/U between test point and chassis ground.	Meter reads 0.15 volt.	Detail parts of 30-cycle filter.
6B	Test Point (B_4)	Connect Voltmeter IN-50 (500-volt range) between test point and chassis ground.	Meter reads 150 volts.	Resistor R246.
		Connect Electronic Multimeter ME-6B/U between test point and chassis ground.	Meter reads 8.0 volts.	
6C	Test Point (B_5)	Connect Electronic Multimeter ME-6B/U between test point and chassis ground.	Meter reads 1.2 volts.	Detail parts of 60-cycle filter.
6D	Test Point (B_6)	Connect Voltmeter IN-50 (500-volt range) between test point and chassis ground.	Meter reads 220 volts.	Resistor R252. Capacitors C207B, C233. Transformer T202.
		Connect Electronic Multimeter ME-6B/U between test point and chassis ground.	Meter reads 45 volts.	
7	Test Points (D) and (E)	Connect Electronic Multimeter ME-6B/U between test points.	Meter reads between 3.6 and 4.0 volts.	Tubes V201A, V203A, V203B, V204A, V205A, V204B. Reference channel detail parts; measure input and output a-c and d-c voltages and compare with values shown on figure 7-16.
		VAR LOC CIRCUIT TESTS		
8	None	Same as steps 1 through 4, except set control unit OMNI-VAR LOC switch to VAR LOC.	Same as steps 1 through 4.	Same as steps 1 through 4.
9	None	Set Signal Generator SG-66/ARM-5 function switch to AMP LOC (needle center).	Vertical pointer centers.. Vertical pointer flag-alarm out of sight. (If a 0-1 ma 1000-ohm meter is used to replace flag movement, its reading should be between 0.3 and 0.45 ma for a "needle center" position.)	Balance resistor R264 misadjusted; readjust to obtain "on-course" reading.
10	None	Set Signal Generator SG-66/ARM-5 function switch to AMP LOC (needle left).	Vertical pointer swings left to outer edge of blue sector. Vertical pointer flag-alarm is out of sight. (This corresponds to 90 microamperes in meter movement. A 1000-ohm 150-0-150 microammeter may be substituted for cross-pointer meter section, if desired.)	Sensitivity resistor R257 misadjusted; readjust to obtain proper "needle left" indication.

TABLE 6-3. SIGNAL DATA CONVERTER CV-265A/ARN-30A PERFORMANCE TESTS AND TROUBLE ANALYSIS (Cont)

Step	*Test Point*	*Test Procedure*	*Normal Indications*	*Probable Cause of Abnormal Indications*
11	None	Set Signal Generator SG-66/ARM-5 function switch to AMP LOC (needle right).	Vertical pointer swings right to outer edge of yellow sector within about one needle-width (meter current should be 90, ±5, microamperes.) Vertical pointer flag - alarm is out of sight.	If more than one needle-width in error, readjust sensitivity resistor R257 to split error in half between left and right sectors. If not possible to adjust R257 or R264 properly, detail parts of VAR LOC circuit may be faulty; measure input and output a-c and d-c voltages and compare with values shown on figure 7-16.

6-14. ALINEMENT OF RADIO RECEIVER R-445/ARN-30.

6-15. SENSE AND PREFERRED SETTING OF TRIMMER CAPACITORS. When the receiver is alined at the factory, the trimmers are left in such a position that further rotation clockwise will increase capacity. The maximum capacitance position is obtained when the top of the cross on the rotor slot is alined with fixed fiducial line. Turning the rotor 180 degrees in either direction reduces the capacitance to a minimum. When trimming a circuit, always tune in a counterclockwise motion from the maximum capacitance setting. This will always result in a setting of the trimmer such that a clockwise motion increases capacitance.

6-16. ALINEMENT OF THE I-F CIRCUITS. To aline the i-f circuits of Radio Receiver R-445/ARN-30, proceed as follows:

a. Interconnect the test equipment, except Signal Generator SG-66/ARM-5, and the receiver under test as shown in figure 5-1.

b. Turn the equipment on and adjust the RF SENS control of the receiver test harness for maximum gain. Allow a 15-minute warm-up period to ensure stabilization. The sensitivity control is to remain in the maximum position throughout this procedure. The OFF control on the control unit must be kept at the maximum clockwise position.

c. Connect Signal Generator TS-413/U by means of Test Probe ARC-16139 (or a short length of 0.050-inch-diameter insulated wire), inserted into i-f test point J102 located between V102 and V103 (figure 7-1), to the grid of V103. Connect the TS-413/U ground lead as close as possible to the ground of J102.

d. Tune the TS-413/U to 15 mc modulated 30 percent at 400 cycles by the TS-382A/U. Tune the receiver to 131 mc as accurately as possible as indicated by the control unit tuning dial.

e. Remove the knurled cap from each i-f coupling unit.

Note

There are two holes under the knurled caps marked "1" and "2". The trimmer under "1" tunes the primary tuned circuit and the trimmer under "2" tunes the secondary tuned circuit. (See figure 6-1.)

f. Beginning with Z105 (figure 6-1), the fourth i-f coupling unit, make a preliminary alinement of the eight i-f trimming capacitors, alternating from "2" to "1" of each unit. Adjust each trimmer for maximum output. Throughout this procedure keep the receiver output level below two volts in 300-ohm load by adjusting the output level of the TS-413/U.

g. For final i-f alinement, detune the primary ("1") of Z105 in whichever direction gives maximum detuning, and then adjust the secondary ("2") of Z105 for maximum output. Without any readjustment of "2", readjust "1" for maximum output. Keep the receiver output level below two volts.

h. Repeat the procedure of step g. of this paragraph for Z104, Z103, and Z102, in the order listed. (See figure 6-1.)

i. Replace all knurled caps on the i-f coupling units.

6-17. ALINEMENT OF THE R-F CIRCUITS. To aline the r-f circuits of Radio Receiver R-445/ARN-30, proceed as follows:

a. Interconnect the test equipment, including Signal Generator SG-66/ARM-5, and the receiver under test as shown in figure 5-1.

b. Turn the equipment on, adjust the RF SENS control of the receiver test harness for maximum gain, and allow a 15-minute warm-up period to ensure stabilization. The OFF control on the control unit must remain in the maximum clockwise position throughout this procedure.

c. Connect the ATTEN output of Signal Generator SG-66/ARM-5 to antenna connector J101 on the front panel of the receiver.

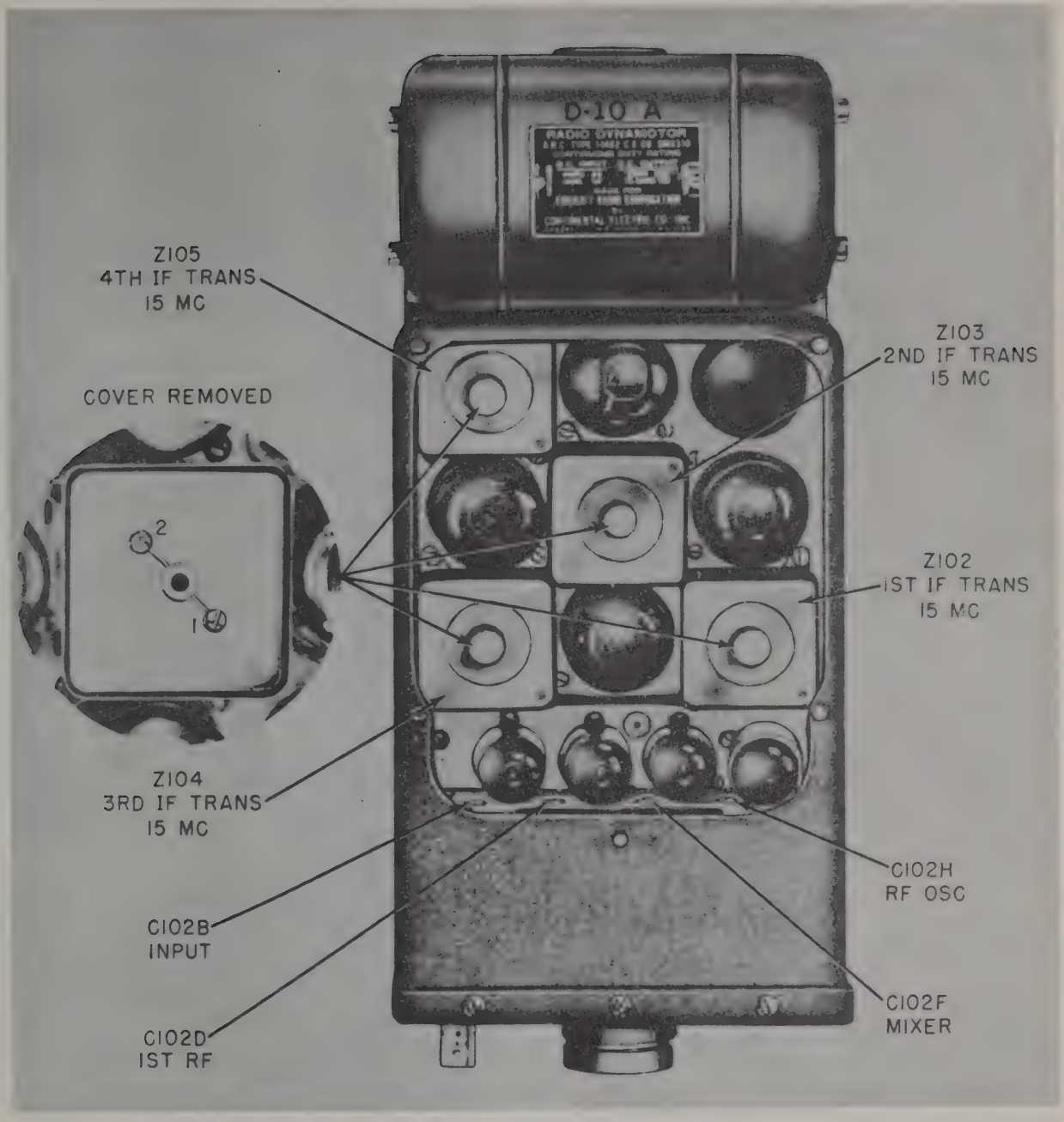


Figure 6-1. Radio Receiver R-445/ARN-30, Alinement Adjustment Points

d. Adjust the SG-66/ARM-5 to 131 mc modulated 30 percent at 400 cycles by the TS-382A/U. Tune the receiver to the SG-66/ARM-5 output frequency as accurately as possible. Check that the control unit tuning dial has been set in accordance with paragraph 3-16 and set the dial exactly at 131 mc.

e. With the SG-66/ARM-5 output set at 1,000 microvolts, and using the special capacitor alinement tool, Wrench ARC-10307, adjust the four gang trimmer capacitors (figure 6-1) starting with the r-f oscillator trimmer C102H. In the order listed, adjust the second r-f amplifier trimmer C102F, the first r-f amplifier trimmer C102D, and the antenna trimmer C102B for maximum output. Throughout this trimming procedure keep the receiver output below 2 volts by appropriate adjustment of the SG-66/ARM-5 output level.

Note

Of the four trimmers noted, C102H, the r-f oscillator trimmer, is the most critical in adjustment. It will require retrimming each time the r-f oscillator tube V104 is replaced.

6-18. ALINEMENT OF SIGNAL DATA CONVERTER CV-265/ARN-30A.

6-19. PRELIMINARY PROCEDURES. Before proceeding to aline Signal Data Converter CV-265/ARN-30A, make the following tests and adjustments:

a. Interconnect the test equipment and the converter under test as shown in figure 5-1.

b. Turn the equipment on, and allow a 15-minute warm-up period to ensure stabilization.

c. With Multimeter TS-352/U (500-volt d-c range) connected between test points HV+ and G of either the receiver or converter test harness, adjust the primary power source voltage to produce a high-voltage reading of 240 volts.

d. With Electronic Multimeter ME-6B/U connected between test points NAV MOD V. and G of the converter test harness, and with NAV MOD SOURCE switch set at EXTERNAL, adjust Signal Generator SG-66/ARM-5 for red line (level set) indications of r-f level and the individual 30-cycle and 9960-cycle modulations, as outlined in the applicable Operation Instructions Handbook (AN 16-30ARM5-1). Then with the SG-66/ARM-5 FUNCTION switch at 30~MOD SET, adjust its DEMOD output to obtain a NAV MOD V. reading of 1.8 volts. Set the FUNCTION switch to OMNI.

e. Turn R206, the reference channel sensitivity control (figure 6-2), to its extreme counterclockwise position, and set R212 approximately at mid-position.

Note

It is assumed that prior to alinement all electron tubes have been tested. Defective tubes should be replaced, and non-defective tubes returned to their original sockets. If satisfactory alinement of the converter, following the procedures of paragraphs 6-20 through 6-32 cannot be achieved, refer to table 6-2.

6-20. ALINEMENT OF OMNI SECTION. Before adjusting the omni section of the converter perform the preliminary procedures outlined in paragraph 6-19, then proceed with paragraphs 6-21 through 6-25.

6-21. TEST OF VARIABLE CHANNEL. Connect the ME-6B/U between test jacks J204 and J205. (See figure 6-2.) With the SG-66/ARM-5 FUNCTION switch at 30~ MOD SET, the meter should read within the limits of 2.7 and 4.1 volts. A reading outside these limits is an indication of trouble in the variable channel. (Refer to table 6-2.)

6-22. TEST AND ALINEMENT OF REFERENCE CHANNEL AND PHASE-COMPARISON CIRCUIT. To test and aline the reference channel and phase-comparison circuit, proceed as follows:

a. With SG-66/ARM-5 FUNCTION switch at 30~ MOD SET, make a preliminary adjustment of R225 to obtain an "on-course" indication of the vertical pointer (that is, zero current). Then set the FUNCTION switch to OMNI and the OMNI TRACK switch to 0 degree.

b. Set the COURSE SELECTOR of the course indicator to 192 degrees. (Refer to paragraph 6-9.)

c. Connect the ME-6B/U test jacks J203 and J204, and adjust R206 to obtain a reading of approximately 4.0 volts.

d. Adjust phasing resistor R212 (figure 6-2) for an "on-course" indication of the vertical pointer.

e. Set the SG-66/ARM-5 OMNI TRACK switch to 180 degrees. Note that the vertical pointer remains centered; if not, readjust balance resistor R225 to reduce the off-center error by one half.

f. Repeat the adjustments of R212 at a 0-degree "angle TO" track and of R225 at a 180-degree track (steps c., d., and e., this paragraph), until "on-course" is indicated at both positions. Lock R225, taking care not to disturb its setting.

6-23. ADJUSTMENT OF COURSE WIDTH. To adjust the course width, proceed as follows:

a. Set the SG-66/ARM-5 OMNI TRACK switch at 0 degree, and set the COURSE SELECTOR at 182 degrees. Adjust reference level control R206 if necessary, to obtain a "five-dot" deflection of the vertical pointer to the right (yellow) side. (Needle should be over last dot on extreme right.) This position corresponds to 150 microamperes.

b. Set the COURSE SELECTOR to 192 degrees and read the reference channel voltage indicated on the ME-6B/U connected between J203 and J204. This must be equal to the variable channel voltage (between J205 and J204; paragraph 6-21) within −0.4, +1.0 volt. If not, change R236 to a value which will produce the required balance of these voltages.

Note

An increase of 10 percent in the value of R236 will increase the variable channel voltage by about 0.4 volt. As the variable channel output voltage (J205 and J204) is raised, the reference channel output voltage (J203 and J204) must be decreased (and vice versa) to maintain the proper "off-course" deflection. Hence the "5-dot" deflection for 10 degrees off-course (step a., this paragraph) must be rechecked whenever the value of R236 or setting of R206 is modified. A slight readjustment of R212 may also be necessary for proper "on-course" indication.

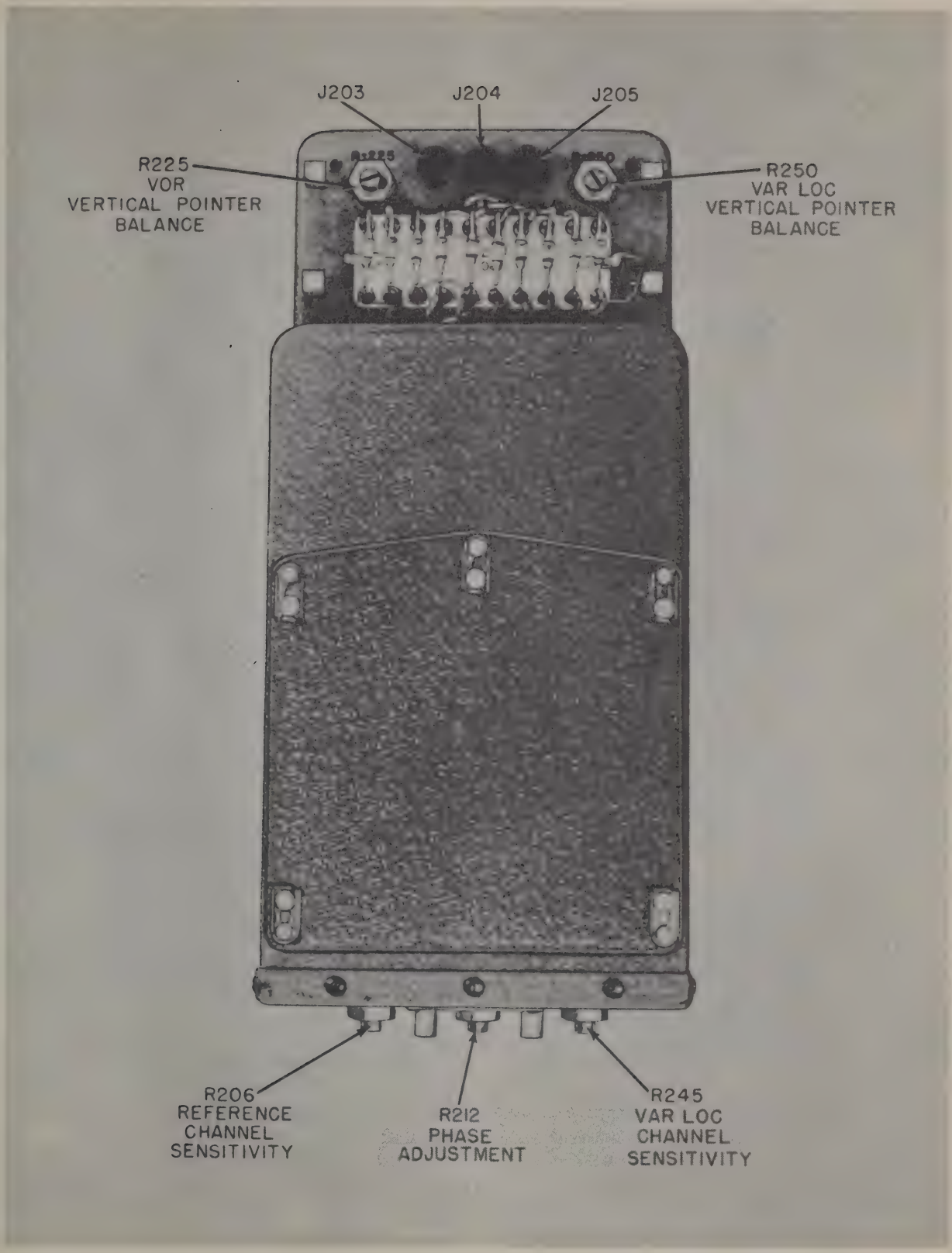


Figure 6-2. Signal Data Converter CV-265/ARN-30A, Adjustment Controls

6-24. CHECK OF REFERENCE CHANNEL LIMITER AND OTHER ELEMENTS. Connect Electronic Multimeter ME-6B/U between Test Point B16, pin 7 of V201B, and chassis ground. Following the adjustments of paragraphs 6-22 and 6-23, a reading within the limits of 0.7 and 1.3 volts should be obtained if the reference channel circuits beyond this test point are functioning properly. Also, if the limiter and 10-kc amplifier V201A are functioning properly, the voltage, as read on the ME-6B/U, between Test Point B8 and chassis ground should be within the limits of 11 and 20 volts. If either or both of these voltages are out of limits, it is an indication of trouble. (Refer to table 6-2.)

6-25. ADJUSTMENT OF PHASE-SPLITTING NETWORK TO MINIMIZE QUADRANTAL ERRORS.

CAUTION

Do not attempt this critical adjustment unless R233 has been damaged, or R234 or C213 has been replaced, or unless the presence of excescive quadrantal error has been postively determined experimentally.

To adjust the phase-splitting network to minimize quadrantal error, proceed as follows:

a. Set the SG-66/ARM-5 OMNI TRACK switch to 30 degrees and adjust the COURSE SELECTOR for an "on-course" indication of the vertical pointer. The COURSE SELECTOR should read 222 degrees very closely (30 degrees plus 192 degrees; refer to paragraphs 6-7 through 6-9). If it does not, subtract 222 degrees from the actual reading, and record the difference, with proper algebraic sign.

b. Set the SG-66/ARM-5 OMNI TRACK switch to 60 degrees. Readjust the COURSE SELECTOR to approximately 252 degrees for "on-course", and again record the difference.

c. Repeat the measurements of step b., this paragraph, for each successive 30-degree angle (that is 90, 120, 150 etc.) around the OMNI TRACK switch, recording the errors of indication as above.

d. Plot a curve of errors as calculated (in degrees) against the setting of the OMNI TRACK switch. If the value of R233 is not optimum, an average curve similar to one of the curves in figure 6-3 will result.

Note

Small random errors will cause the observed points to scatter around such an average curve. Try to average out such random errors in plotting the curve.

In an ideal curve of this type, the peak-to-peak distance "h" of figure 6-3 will be zero.

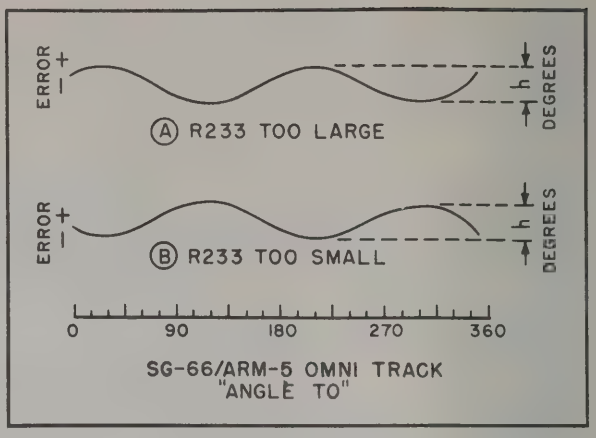


Figure 6-3. Example Curve of Quadrantal Error

e. If the peak-to-peak distance "h" of figure 6-3 is not close to zero, reduce "h" to a minimum by proceeding as follows: If the plotted curve is similar to A of figure 6-3, *decrease* R233 by an amount equal to h (in degrees) x 10,000 ohms; if the plotted curve is similar to B of figure 6-3, *increase* R233 by an amount equal to h (in degrees) x 10,000 ohms.

f. After changing R233 by the amount calculated in step e., this paragraph, plot a new quadrantal error curve (steps a. through d., this paragraph) to confirm the resultant value of R233.

g. When the quadrantal error curve has been made a straight line as nearly as possible, set the SG-66/ARM-5 OMNI TRACK switch to 90 degrees and set the COURSE SELECTOR to 282 degrees.

h. Readjust R212 for an "on-course" indication (or, as required to give minimum error averaged around the compass).

i. Lock R206, R212, and R225, being careful not to disturb their settings. Then check for course accuracy around the full circle, and for flag-alarm and TO-FROM meter operation as described in table 6-2.

6-26. ALINEMENT OF VAR/LOC SECTION.

6-27. PRELIMINARY PROCEDURE. Test and replace V205 in the converter, and perform the preliminary procedures outlined in steps a. through e. of paragraph 6-19.

6-28. "NEEDLE CENTER" ADJUSTMENT. To adjust the "needle center" position, proceed as follows:

a. Set the SG-66/ARM-5 FUNCTION switch to the AMP LOC (⬇) (needle center) position. The vertical pointer should center.

b. If an "on-course" reading is not obtained, adjust balance resistor R250 in the converter (figure 6-2) to obtain this result.

6-29. "NEEDLE LEFT" ADJUSTMENT. To adjust the "needle left" position, proceed as follows:

a. Set the SG-66/ARM-5 FUNCTION switch to AMP LOC (needle left). The vertical pointer should be at the outer edge of the blue (left) sector of the meter dial, corresponding to 90 microamperes in the meter movement.

b. If proper pointer deflection is not obtained, adjust sensitivity resistor R245 (figure 6-2) as required.

6-30. "NEEDLE RIGHT" ADJUSTMENT. To adjust the "needle right" position, proceed as follows:

a. Set the SG-66/ARM-5 FUNCTION switch to AMP LOC (needle right). The vertical pointer should lie at the outer edge of the yellow (right) sector of the meter dial within about needle width, corresponding to 90 (±5) microamperes.

b. If the deviation from the correct position is more than about one needle width, readjust sensitivity resistor R245, so as to cut the error in half. This procedure splits the total error between the left and right sectors.

6-31. FLAG CURRENT CHECK. In all of the three vertical pointer adjustments (paragraphs 6-28 through 6-30) check that the flag is solidly down. (If a 0-1 milliampere, 100-ohm meter is used to replace the flag movements, its reading should be between 0.3 and 0.45 ma for a "needle center" signal.)

6-32. PROCEDURE FOLLOWING VERTICAL POINTER ADJUSTMENTS. Following the vertical pointer adjustments described in paragraphs 6-28 through 6-30, proceed as follows:

a. Lock resistors R250 and R245, taking care not to disturb their settings, and recheck the vertical pointer indications for each of the AMP LOC settings of the SG-66/ARM-5.

b. The "on-course" (needle center) indication should not be detectable in error, equivalent to 0 (±2) microampere.

c. The "needle left" and "needle right" positions should be at the ends of their respective colored sectors within about two needle widths, equivalent to 81 to 99 microamperes meter current in each case. Residual errors should be approximately balanced on both sides.

d. If proper results are not obtained, check the VAR LOC section of the converter. (Refer to table 6-2.)

6-33. ALINEMENT OF SIGNAL DATA CONVERTER CV-265A/ARN-30A.

6-34. PRELIMINARY PROCEDURES. Before proceeding to aline Signal Data Converter CV-265A/ARN-30A, make the following tests and adjustments:

a. Interconnect the test equipment and the converter under test as shown in figure 5-1.

b. Turn the equipment on, and allow a 15-minute warm-up period to ensure stabilization.

c. With Voltmeter I-50 (500-volt range) connected between either the receiver or converter test harness HV + and G test points, adjust the primary power source voltage to produce a high-voltage reading of 240 volts. The primary power voltage should be 27.5 volts.

d. With the Electronic Multimeter ME-6B/U connected between the converter test harness NAV MOD V. and G test points, and with the NAV MOD SOURCE switch set at EXTERNAL, adjust Signal Generator SG-66/ARM-5 for "level set" indications of the r-f level and the individual 30-cycle and 9960-cycle modulations. Then, with the FUNCTION switch set at 30~ MOD, adjust the signal generator DEMOD output to obtain a NAV MOD V. reading of 1.8 volts. Set the FUNCTION switch to OMNI.

e. Turn R226 (figure 6-4) to its extreme counterclockwise position, and set R225 and R239 approximately at mid-position.

Note

It is assumed that prior to alinement all electron tubes have been tested. Defective tubes should be replaced and non-defective tubes returned to their original sockets. If satisfactory alinement of the converter, following the procedures of paragraphs 6-35 through 6-42 cannot be achieved, refer to table 6-3.

6-35. ADJUSTMENT OF OMNI SECTION. Before adjusting the omni section of the converter, perform the preliminary procedures outlined in paragraph 6-34, then proceed with the instructions of paragraphs 6-36 through 6-42.

6-36. ADJUSTMENT OF VARIABLE CHANNEL. Connect the Electronic Multimeter ME-6B/U between converter test jacks J202 and J203. (See figure 6-4.) With the SG-66/ARM-5 FUNCTION switch set to 30~ MOD, adjust the variable channel output voltage by means of VAR level control R250 to 4.0 (±0.5) volts.

6-37. ADJUSTMENT OF REFERENCE CHANNEL AND PHASE-COMPARISON CIRCUIT. To adjust the reference channel and phase-comparison circuit, proceed as follows:

a. With Signal Generator SG-66/ARM-5 set to 30~ modulation, make a preliminary adjustment of BAL potentiometer R239 to obtain an "on-course" indication on the vertical pointer. This is equivalent to zero current.

b. Set the signal generator modulation switch to OMNI, the OMNI TRACK switch to 0 degree and the COURSE SELECTOR to 191.5 degrees.

c. Connect the ME-6B/U between test jacks J201 and J202, and adjust REF LEVEL potentiometer R226 to obtain a reading of approximately 4.0 volts.

d. Adjust PHASE potentiometer R225 for an "on-course" indication on the vertical pointer.

e. Set the signal generator OMNI TRACK switch to 180 degrees. The vertical pointer should remain centered ("on-course"); if not, readjust BAL potentiometer R239 to reduce the off-center error by one half.

f. Repeat the adjustments of R225, at a 0-degree ANGLE TO track, and of R239, at a 180-degree track (steps c., d., and e., this paragraph), until "on-course" is indicated at both 0 degree and 180 degrees. Lock R239, taking care not to disturb its setting.

6-38. ADJUSTMENT OF COURSE SENSITIVITY. To adjust the course sensitivity, proceed as follows:

a. Set the SG-66/ARM-5 OMNI TRACK switch at 0 degree, and set the COURSE SELECTOR to 181.5 degrees. Adjust REF LEVEL control R226, if necessary, to obtain a "five-dot" deflection of the vertical needle to the right (yellow) side. (This corresponds to 150 microamperes.) Reset PHASE control R225 for an "on-course" indication, with the COURSE-

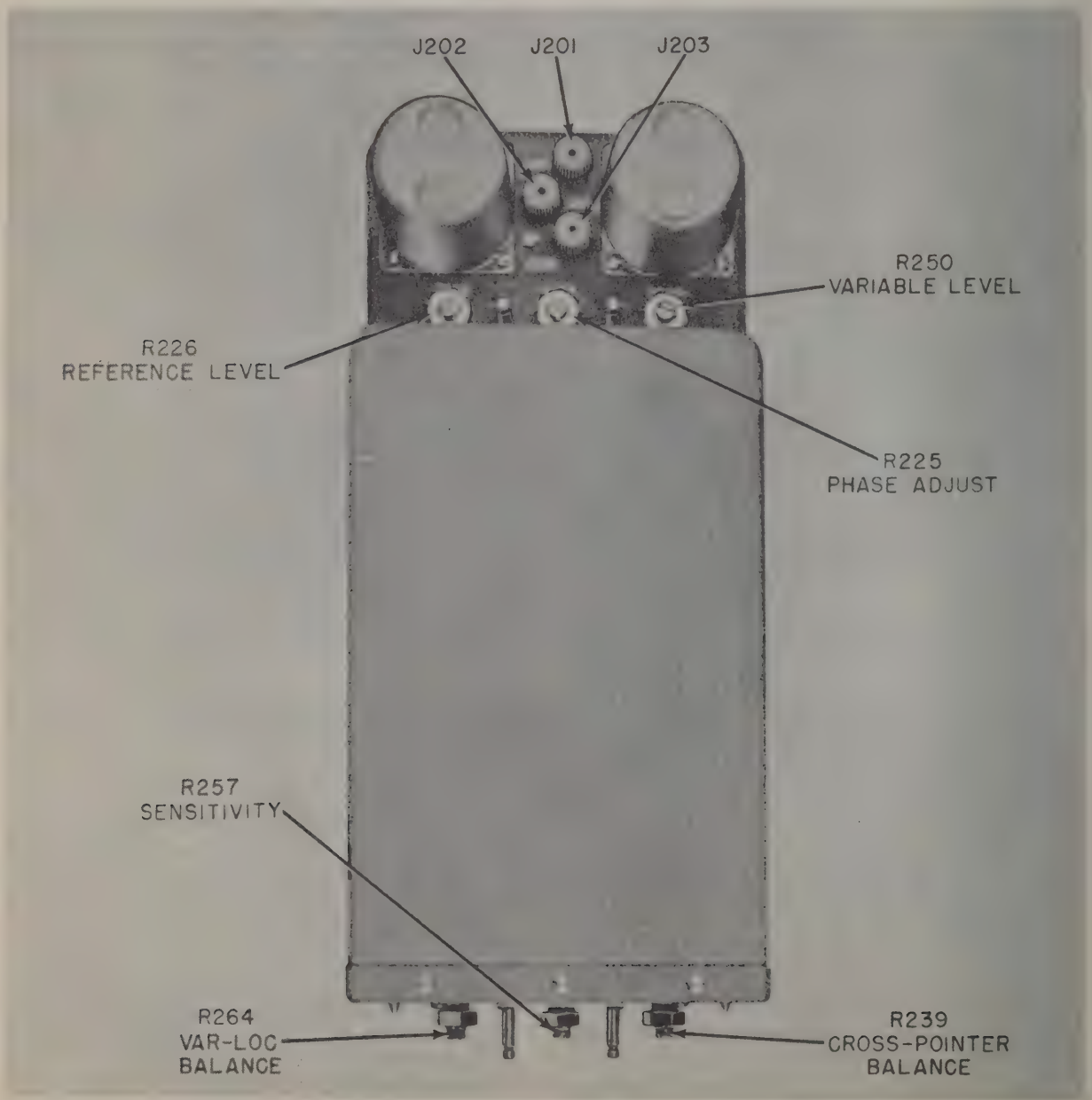


Figure 6-4. Signal Data Converter CV-265A/ARN-30A, Alinement Adjustment Points

SELECTOR set to 191.5 degrees. Repeat the procedure if necessary.

b. Measure the reference channel output voltage with the Electronic Multimeter ME-6B/U connected between test jacks J201 and J202. If it is not equal to the variable channel output (4 volts; paragraph 6-37, step c.) within ±0.5 volt, adjust VAR LEVEL potentiometer R250 to produce the required balancing of these outputs.

Note

As the variable channel output (J202 and J203) is raised, the reference channel output (J202 and J201) must be decreased (and vice versa) to maintain the proper "off-course" deflection of 10 degrees. Hence, the "5-dot" deflection for 10 degrees off-course must be rechecked whenever the setting of either R226 or R250 is changed. If R250 was readjusted in this step, repeat steps d. and e. of paragraph 6-37, and then lock R239, R226, R225, and R250.

6-39. CHECK OF REFERENCE CHANNEL LIMITER INPUT AND OUTPUT, AND OTHER CIRCUITS. Connect Electronic Multimeter ME-6B/U between pin 7 of V203A and chassis ground. Following the adjustments of paragraphs 6-37 and 6-38, a reading within the limits of 0.9 and 1.1 volts should be obtained if the reference channel circuits beyond this test point are functioning properly. Also, if the limiter and 10-kc amplifier V201A are functioning properly, the voltage, as read on the meter pin 4 of V201A and chassis ground, should be within the limits of 2.8 and 3.4 volts. If either or both of these voltages are out of limits, it is an indication of trouble.

6-40. ADJUSTMENT OF PHASE-SPLITTING NETWORK TO MINIMIZE QUADRANTAL ERRORS.

CAUTION

Do not attempt this critical adjustment unless R222 has been damaged, or R221 or C210 has been replaced, or the presence of excessive quadrantal error has been positively determined experimentally.

To adjust the phase-splitting network to minimize quadrantal error, proceed as follows:

a. Set the SG-66/ARM-5 OMNI TRACK switch to 30 degrees and adjust the COURSE SELECTOR for an "on-course" indication of the vertical needle. The course indicator should read 222 degrees very closely (30 degrees plus 191.5 degrees; refer to paragraphs 6-22 through 6-25). If it does not, subtract 222 degrees from the actual reading and record the difference with proper algebraic sign.

b. Set the signal generator OMNI TRACK switch to 60 degrees. Readjust the COURSE SELECTOR to approximately 252 degrees for an "on-course" vertical needle indication, and again record the difference.

c. Repeat the measurements of step a., this paragraph, for each successive 30-degree angle (that is, 90, 120, 150, etc.) around the OMNI TRACK switch, recording the errors of indication as in the previous steps.

d. Plot a curve of errors as calculated (in degrees) against the setting of the OMNI TRACK switch. If the value of R222 is not optimum, an average curve similar to one of the curves shown in figure 6-3 will result.

Note

Small random errors will cause the observed points to scatter around such an average curve. Attempt to average out such random errors in plotting the curve.

In an ideal curve of this type, the peak-to-peak distance "h" of figure 6-3 will be zero.

e. If the peak-to-peak distance "h" of figure 6-3 is not close to zero, reduce "h" to a minimum by proceeding as follows: If the plotted curve is similar to A of figure 6-3, *decrease* R222 by an amount equal to "h" (in degrees) x 10,000 ohms; if the plotted curve is similar to B of figure 6-3, *increase* R222 by an amount equal to "h" (in degrees) x 10,000 ohms.

f. After changing R222 by the amount calculated in step e, this paragraph, plot a new quadrantal error curve (steps a. through d., this paragraph) to conform to the resultant value of R222.

g. When the quadrantal error curve has been made as nearly a straight line as possible, set the signal generator OMNI TRACK switch to 90 degrees and set the COURSE SELECTOR to 282 degrees.

h. Unlock R225 and adjust it for an "on-course" vertical needle indication, or as required to give minimum error averaged around the compass degrees. Lock R225, taking care not to disturb its setting.

i. Check for course accuracy around the full circle, and for flag-alarm and TO-FROM meter operation, as described in table 6-3.

6-41. ALINEMENT OF VAR/LOC SECTION.

6-42. To adjust the VAR/LOC section of the converter, proceed as follows:

a. Interconnect the test equipment and the converter under test as shown in figure 5-1.

b. Set the control unit OMNI-VAR LOC switch to VAR LOC.

c. Apply low-voltage power and allow the equipment to warm up for 15 minutes.

d. Apply 1.8 volts of AMP LOC (⇓) (needle center) modulation from signal generator to the receiver test harness EXT NAV MOD input.

e. Set SENS potentiometer R257 at approximately a two-thirds clockwise position and adjust BAL potentiometer R264 to obtain an "on-course" indication by the vertical pointer.

f. Set the signal generator modulation to AMP LOC (needle left) and adjust R257 until the vertical pointer lies at the outer edge of the blue sector on the dial. (This position corresponds to 90 microamperes; if desired, a 1000-ohm, 150-0-150 microammeter may be used in place of the cross-pointer meter section.)

g. Set the signal generator to AMP LOC (needle right). The vertical needle should lie at the outer edge of the yellow sector, plus or minus about one needle width. The equivalent meter current should be 90 (± 5) microamperes. If the needle differs from the specified deflection, readjust R257 to reduce the difference by one-half.

h. Lock R257 and R264, taking care not to disturb their settings, and recheck all the AMP LOC needle settings of the signal generator. The "on-course" indication should not be detectable in error, equivalent to 0 (± 2) microampere, and the "needle left" and "needle right" positions should be at the ends of their respective colored sections within about two needle widths, equivalent to 85 to 95 microamperes meter current in each case. Residual errors should be approximately balanced on both sides. In all settings, the flag-alarm should be completely out of sight.

6-43. SYSTEM CHECK FOLLOWING ALINEMENT.

6-44. After alining or adjusting any of the units, such units should be bench-tested in an over-all set as described in table 5-1.

6-45. LUBRICATION.

6-46. No lubrication other than that indicated in figures 5-5 and 5-6 is required.

6-47. MAINTENANCE AND INSPECTION SCHEDULE.

6-48. Refer to table 5-2 for inspection data.

6-49. OVERHAUL SCHEDULE.

6-50. Table 6-4 lists the units of the set requiring regular overhaul, and the time period at which overhaul should take place.

TABLE 6-4. OVERHAUL SCHEDULE

Component	*Time Period*
Antenna AS-580A/ARN-30	120 hours
Antenna Coupler ARC Type A-17	120 hours
Course Indicator ID-322/ARN-30	120 hours
Course Indicator ID-453/ARN-30	120 hours
Dynamotor DY-86/ARN-30	120 hours
Indicator ID-48/ARN	120 hours
Interconnecting cables	120 hours
Mounting MT-1046/ARN-30	Annually
Mounting MT-1174/ARN-30A	Annually
Mounting MT-1175/ARN-30A	120 hours
Mounting MT-1508/ARN-30A	120 hours
Mounting MT-1509/ARN-30A	120 hours
Mounting MT-1510/ARN-30A	Annually
Radio Receiver R-445/ARN-30	120 hours
Radio Set Control C-984/ARN-30	120 hours
Radio Set Control C-1254/ARN-30	120 hours
Signal Data Converter CV-265/ARN-30A or CV-265A/ARN-30A	120 hours

SECTION VII
DIAGRAMS

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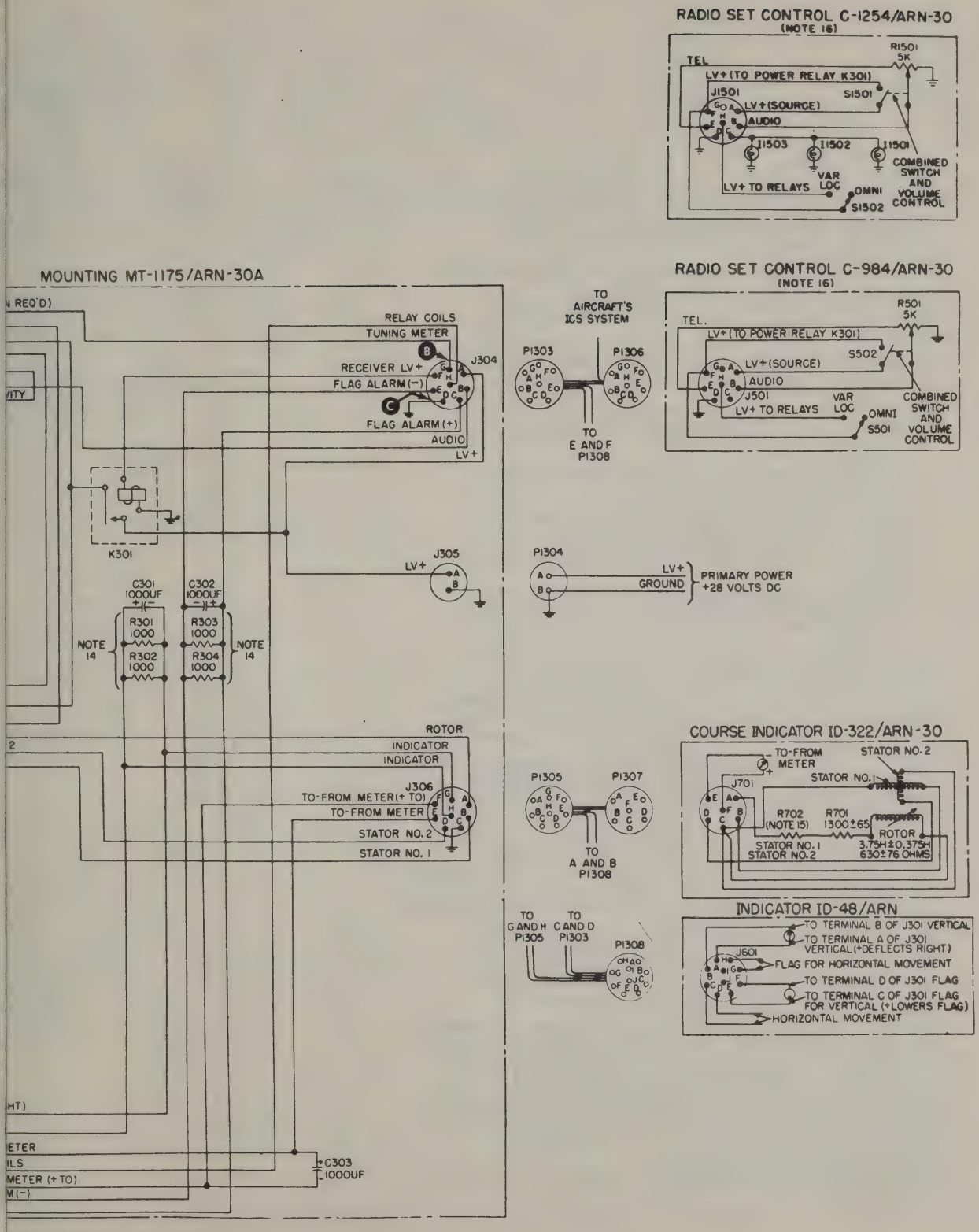
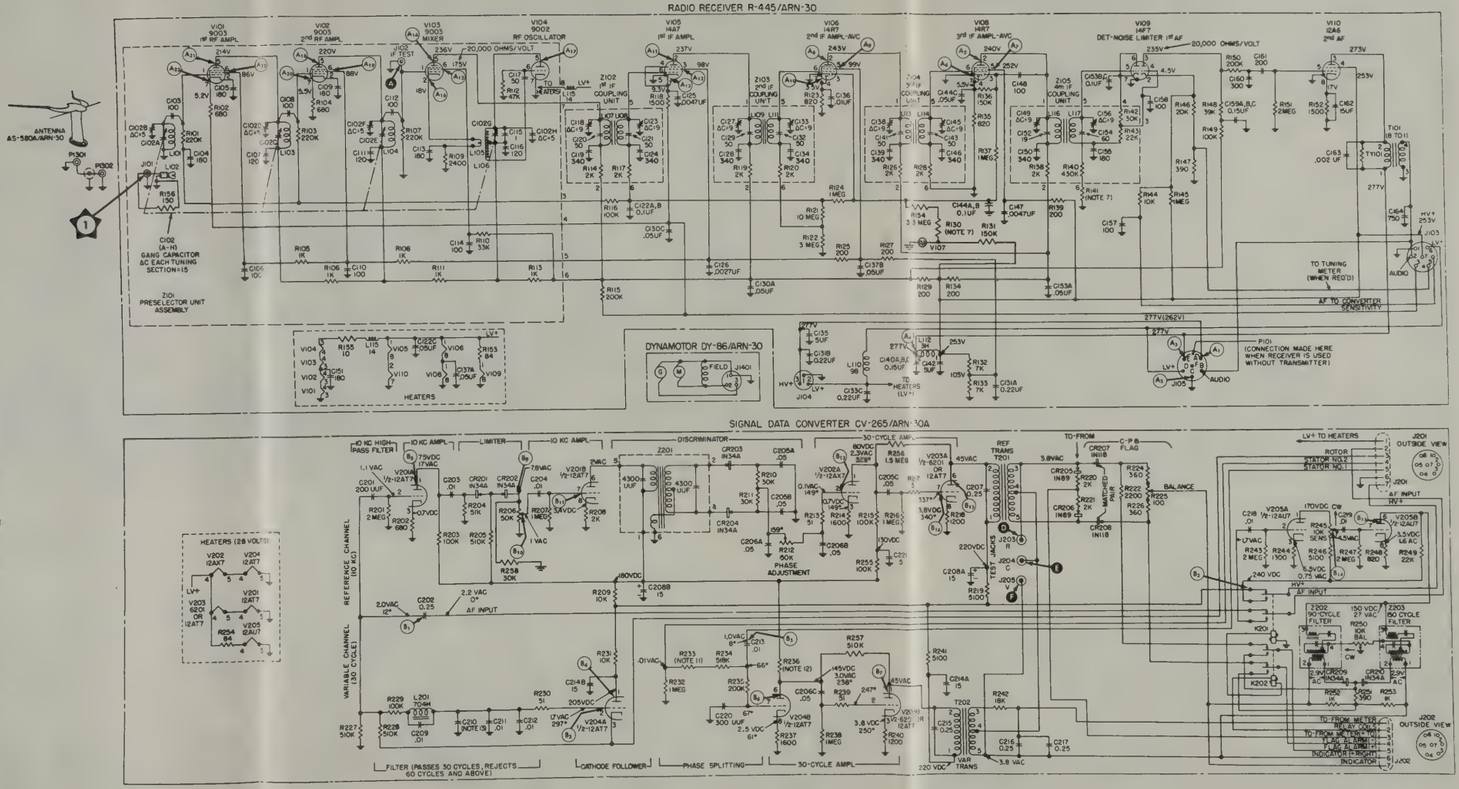


Figure 7-1. Radio Receiving Set AN/ARN-30A, Schematic Diagram

NOTES:

1. ALL CONNECTORS ARE SHOWN AS SEEN FROM WIRED SIDE.
2. ALL CAPACITOR VALUES ARE IN MICROMICROFARADS (UUF), UNLESS FOLLOWED BY "UF" - MICROFARADS.
3. ALL RESISTOR VALUES ARE IN OHMS. MULTIPLIER K = 1000; MEG = 1,000,000.
4. ALL INDUCTOR VALUES ARE IN MICROHENRIES (UH), UNLESS FOLLOWED BY "MH" - MILLIHENRIES OR "H" - HENRY.
5. THE RECEIVER INTERMEDIATE FREQUENCY IS 15MC. (THE R-F OSCILLATOR FREQUENCY IS 15MC LESS THAN THE R-F SIGNAL FREQUENCY.)
6. THE D-C VOLTAGES SHOWN ON THE RECEIVER SCHEMATIC ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) NEGATIVE TERMINAL OF VOLTMETER USED GROUNDED TO CHASSIS.
   (B) THE LOW VOLTAGE (+) AT TERMINAL 2 OF J104 SET AT 27 VOLTS BY ADJUSTMENT OF THE PRIMARY POWER SOURCE.
   (C) THE SENSITIVITY LINE (TERMINAL 3 OF J103) GROUNDED: NO SIGNAL INPUT.
   (D) EITHER MULTIMETER TS-352/U (20,000 OHMS-PER-VOLT) OR TS-297/U (1000 OHMS-PER-VOLT) USED, EXCEPT WHERE SPECIFICALLY INDICATED.
   (E) VOLTAGES IN PARENTHESES ARE THOSE OBTAINED WHEN DYNAMOTOR DY-86/ARN-30 SUPPLIES 130MA TO A TRANSMITTER (SUCH AS RADIO TRANSMITTER T-366A/ARC OR T-368A/ARC) CONNECTED TO J106; NO RECEIVER CURRENT DRAIN.
   (F) VOLTAGES SHOWN WILL BE LOWERED APPROXIMATELY 5 PER CENT WHEN THE DYNAMOTOR SUPPLIES 14MA TO THE CONVERTER IN ADDITION TO THE NORMAL RECEIVER DRAIN OF 70MA.
7. THE VALUES OF R130 AND R141 ARE SELECTED AT TIME OF FINAL FACTORY ADJUSTMENT FROM THE FOLLOWING RANGES:
   R130 0 to 2MEG R141 56K to 150K
8. THE D-C VOLTAGES SHOWN ON THE CONVERTER SCHEMATIC WERE OBTAINED USING MULTIMETER TS-352/U (20,000 OHMS-PER-VOLT), AND ARE APPROXIMATE, WITH POWER SUPPLIED BY THE DYNAMOTOR ON THE RECEIVER.
9. TYPICAL A-C VOLTAGES FOR THE CONVERTER WERE OBTAINED WITH ELECTRONIC MULTIMETER ME-6B/U, OR EQUIVALENT, AND ARE MEASURED TO GROUND WITH THE EXCEPTION OF T201 AND T202 SECONDARY VOLTAGES WHICH WERE MEASURED TO THE COMMON CENTER TAP.
10. TYPICAL CONVERTER PHASE ANGLES OF VARIOUS 30 CPS VOLTAGES ARE MEASURED WITH RESPECT TO THE A-F INPUT VOLTAGE, MEASURED ON COURSE "TO", COURSE SELECTOR SET AT 189 DEGREES.
11. R333 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 20K OHMS; ITS PURPOSE IS TO MINIMIZE QUADRANTAL ERRORS.
12. R236 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 8300 TO 30K OHMS; ITS PURPOSE IS TO ADJUST THE VARIABLE CHANNEL OUTPUT.
13. C210 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 10,000 UUF; ITS PURPOSE IS FOR PHASE ADJUSTMENT.
14. WITH SHUNT RESISTORS R302, R303, AND R304 AS SHOWN, THE EQUIPMENT IS ADJUSTED TO FEED ONE VERTICAL POINTER AND ONE FLAG. FOR EACH ADDITIONAL VERTICAL POINTER (OR EQUIVALENT LOAD SUCH AS A ZERO READER) REMOVE EITHER R301 OR R302. FOR EACH ADDITIONAL FLAG LOAD, REMOVE EITHER R303 OR R304.
15. VALUE OF R702 SELECTED BETWEEN 0 AND 270 OHMS TO PRODUCE A TOTAL RESISTANCE, BETWEEN TERMINALS A AND C OF J701, OF 2060 (±30) OHMS AT +25° C (+77° F).
16. RADIO SET CONTROL C-994/AHN-30 AND RADIO SET CONTROL C-1254/ARN-30 ARE INTERCHANGEABLE.
17. FOR APPLICABLE WIRING DIAGRAMS SEE FIGURES 7-4, 7-5, 7-7, 7-10, 7-11 AND 7-12.



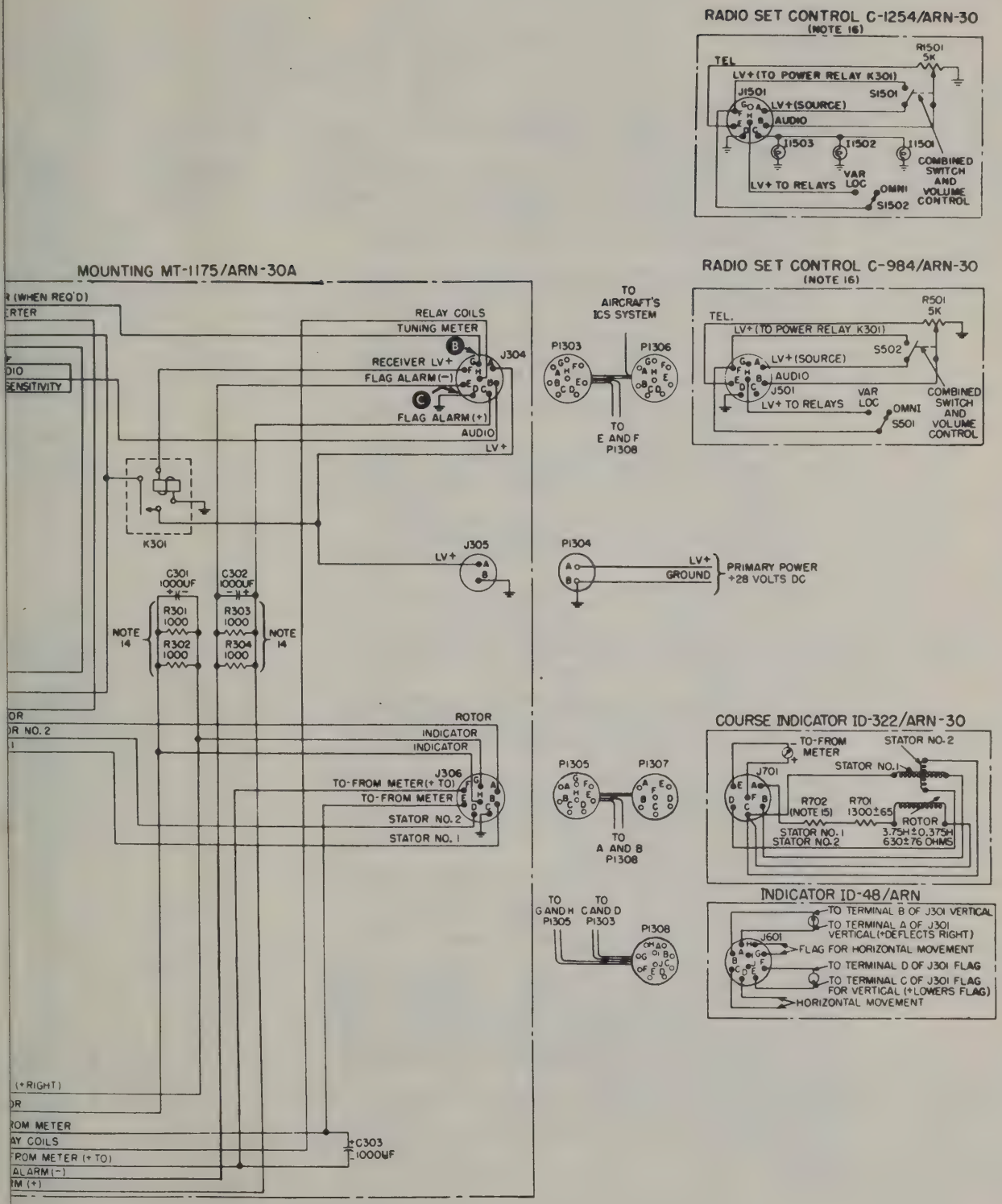
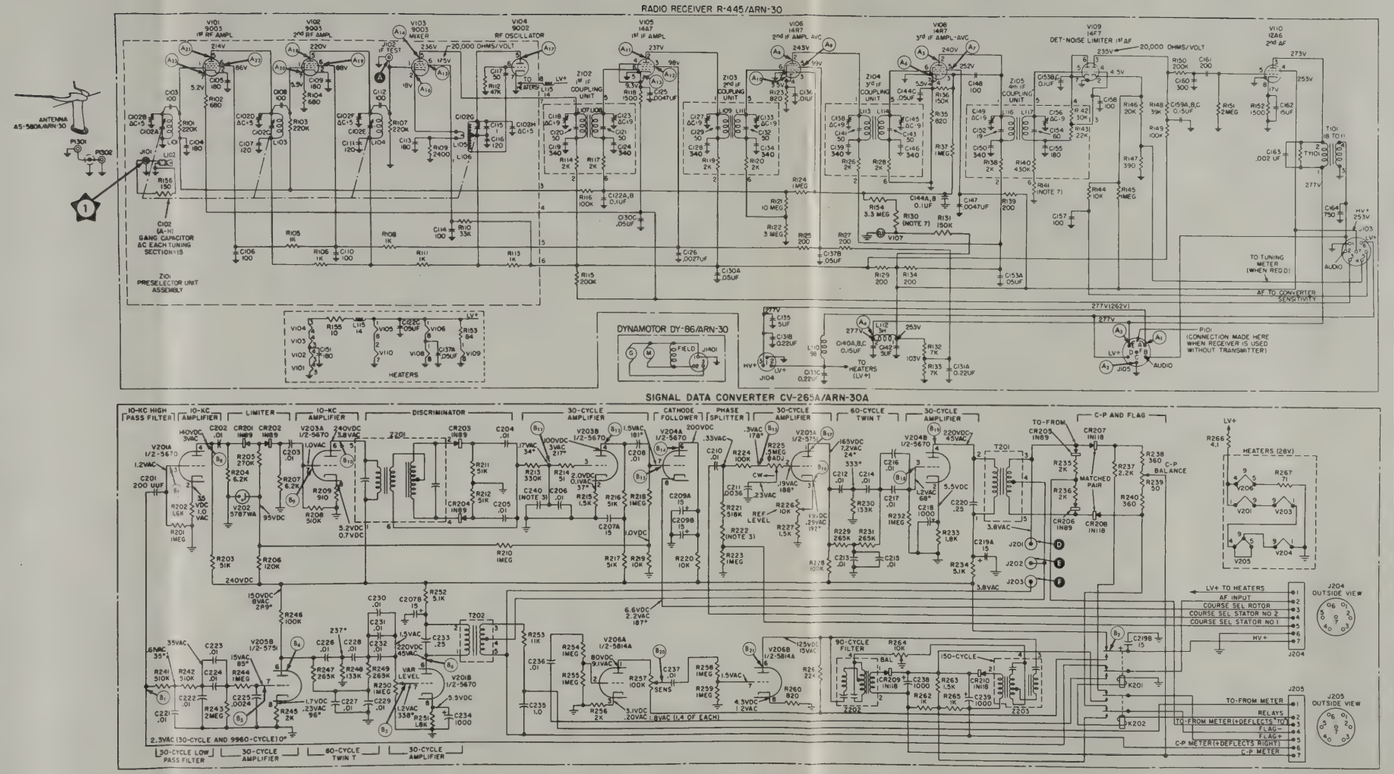
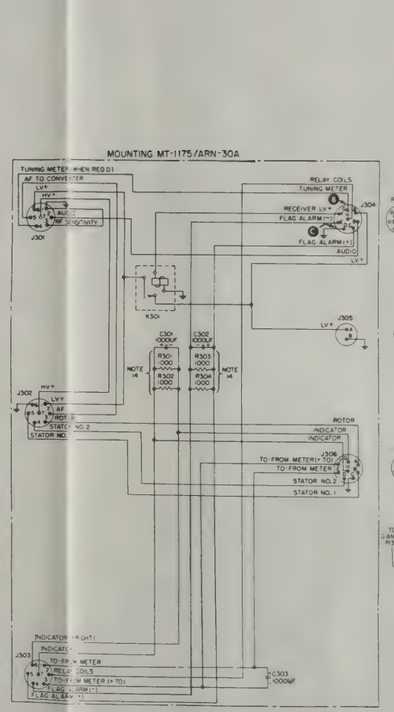


Figure 7-2. Radio Receiving Set AN/ARN-30B, Schematic Diagram

NOTES:

1. ALL CONNECTORS ARE SHOWN AS SEEN FROM WIRED SIDE.
2. ALL CAPACITOR VALUES ARE IN MICROMICROFARADS (UUF), UNLESS FOLLOWED BY "UF" - MICROFARADS.
3. ALL RESISTOR VALUES ARE IN OHMS. MULTIPLIER K = 1000; MEG = 1,000,000.
4. ALL INDUCTOR VALUES ARE IN MICROHENRIES (UH), UNLESS FOLLOWED BY "MH" - MILLIHENRIES OR "H" - HENRY.
5. THE RECEIVER INTERMEDIATE FREQUENCY IS 15MC. (THE R-F OSCILLATOR FREQUENCY IS 15MC LESS THAN THE R-F SIGNAL FREQUENCY.)
6. THE D-C VOLTAGES SHOWN ON THE RECEIVER SCHEMATIC ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) NEGATIVE TERMINAL OF VOLTMETER USED GROUNDED TO CHASSIS.
   (B) THE LOW VOLTAGE (-) AT TERMINAL 3 OF J104 SET AT 27 VOLTS BY ADJUSTMENT OF THE PRIMARY POWER SOURCE.
   (C) THE SENSITIVITY LINE (TERMINAL 3 OF J103) GROUNDED: NO SIGNAL INPUT.
   (D) EITHER MULTIMETER TS-352/U (20,000 OHMS-PER-VOLT) OR TS-297/U (1000 OHMS-PER-VOLT) USED, EXCEPT WHERE SPECIFICALLY INDICATED.
   (E) VOLTAGES IN PARENTHESES ARE THOSE OBTAINED WHEN DYNAMOTOR DY-86/ARN-30 SUPPLIES 130MA TO A TRANSMITTER (SUCH AS RADIO TRANSMITTER T-366A/ARC OR T-363A/ARC) CONNECTED TO J105; NO RECEIVER CURRENT DRAIN.
   (F) VOLTAGES SHOWN WILL BE LOWERED APPROXIMATELY 5 PER CENT WHEN THE DYNAMOTOR SUPPLIES 145MA TO THE CONVERTER IN ADDITION TO THE NORMAL RECEIVER DRAIN OF 70MA.
7. THE VALUES OF R130 AND R141 ARE SELECTED AT TIME OF FINAL FACTORY ADJUSTMENT FROM THE FOLLOWING RANGES:
   R130 0 to 2MEG R141 56K to 180K
8. THE D-C VOLTAGES SHOWN ON THE CONVERTER SCHEMATIC WERE OBTAINED USING MULTIMETER TS-352/U (20,000 OHMS-PER-VOLT), AND ARE APPROXIMATE, WITH POWER SUPPLIED BY THE DYNAMOTOR ON THE RECEIVER.
9. TYPICAL A-C VOLTAGES FOR THE CONVERTER WERE OBTAINED WITH ELECTRONIC MULTIMETER ME-6B/U, OR EQUIVALENT, AND ARE MEASURED TO GROUND WITH THE EXCEPTION OF T201 AND T202 SECONDARY VOLTAGES WHICH WERE MEASURED TO THE COMMON CENTER TAP.
10. TYPICAL CONVERTER PHASE ANGLES OF VARIOUS 30 CPS VOLTAGES ARE MEASURED WITH RESPECT TO THE A-F INPUT VOLTAGE, MEASURED ON COURSE "TO", COURSE SELECTOR SET AT 189 DEGREES.
11. R233 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 20K OHMS; ITS PURPOSE IS TO MINIMIZE QUADRANTAL ERRORS.
12. R236 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 8200 TO 20K OHMS; ITS PURPOSE IS TO ADJUST THE VARIABLE CHANNEL OUTPUT.
13. C210 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 10,000 UUF; ITS PURPOSE IS FOR PHASE ADJUSTMENT.
14. WITH SHUNT RESISTORS R302, R303, AND R304 AS SHOWN, THE EQUIPMENT IS ADJUSTED TO FEED ONE VERTICAL POINTER AND ONE FLAG. FOR EACH ADDITIONAL VERTICAL POINTER (OR EQUIVALENT LOAD SUCH AS A ZERO READER) REMOVE EITHER R301 OR R302. FOR EACH ADDITIONAL FLAG LOAD, REMOVE EITHER R303 OR R304.
15. VALUE OF R702 SELECTED BETWEEN 0 AND 270 OHMS TO PRODUCE A TOTAL RESISTANCE, BETWEEN TERMINALS A AND C OF J701, OF 2080 (±30) OHMS AT +25° C (+77° F).
16. RADIO SET CONTROL C-984/ARN-30 AND RADIO SET CONTROL C-1254/ARN-30 ARE INTERCHANGEABLE.
17. FOR APPLICABLE WIRING DIAGRAMS SEE FIGURES 7-4, 7-5, 7-7, 7-10, 7-11 AND 7-12.





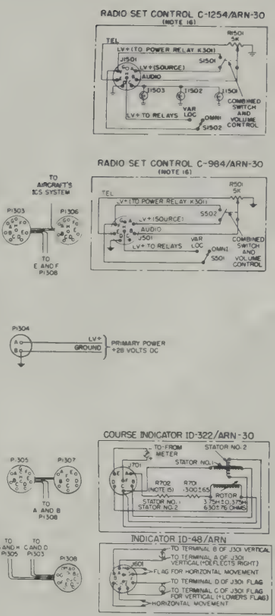
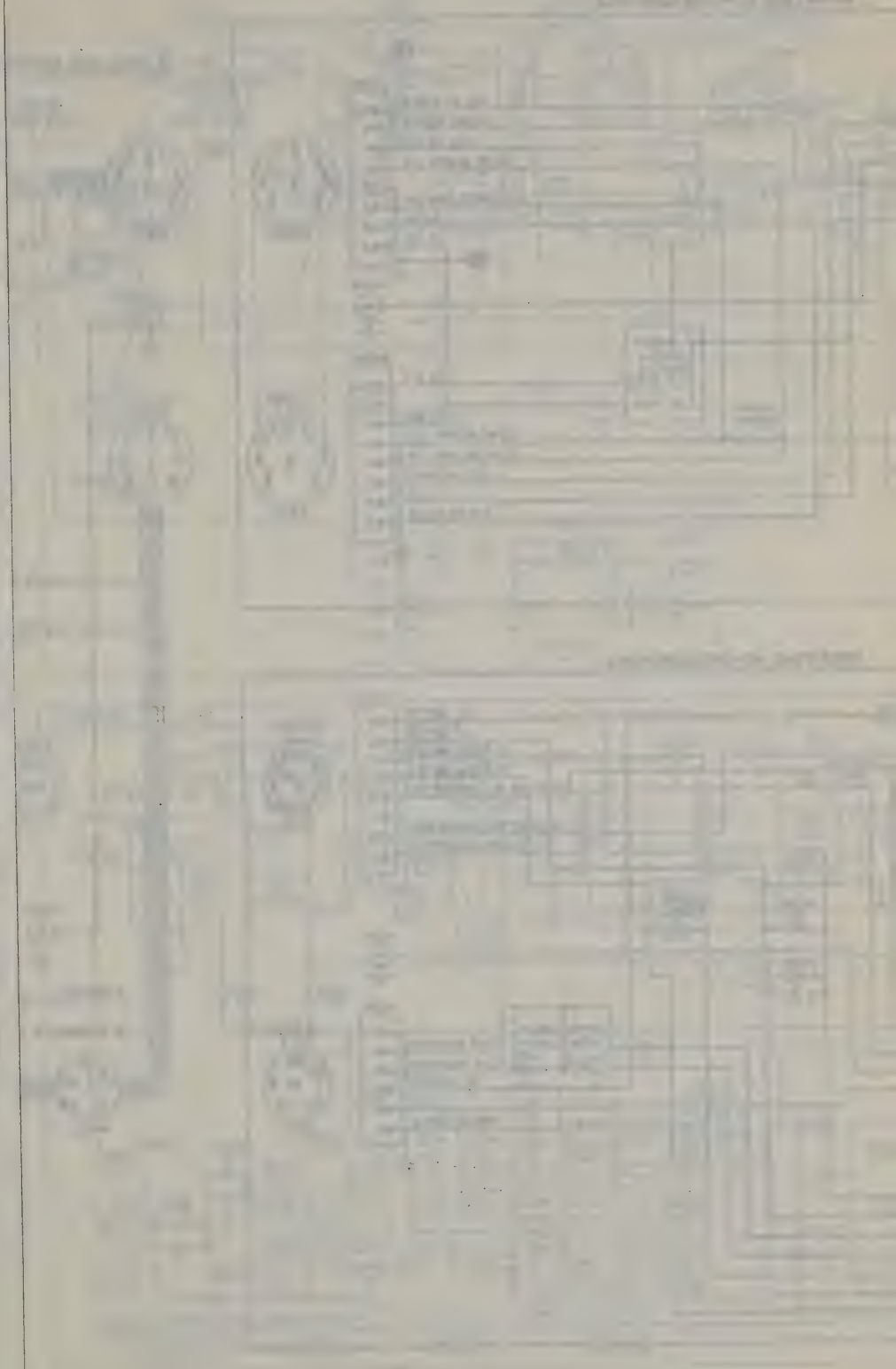
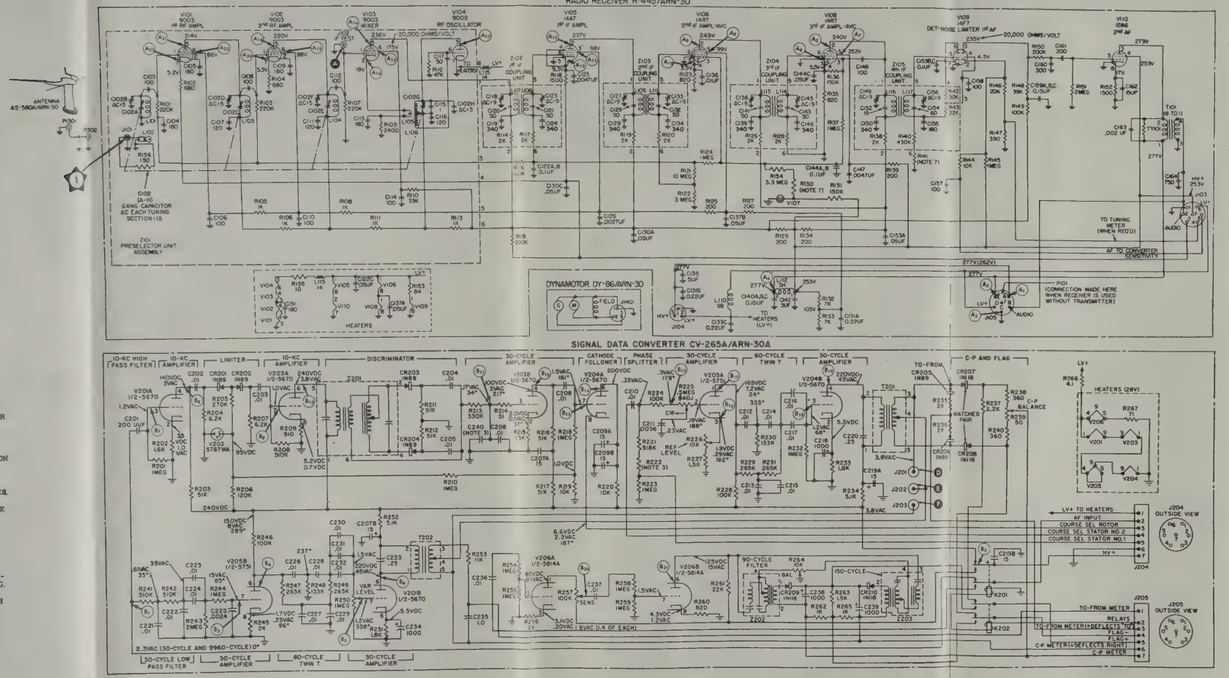
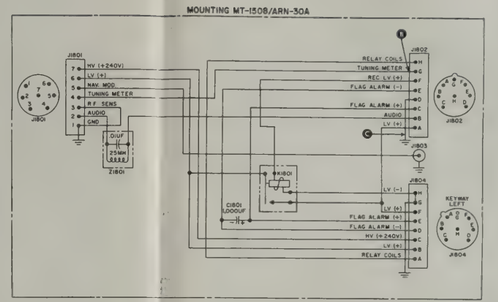


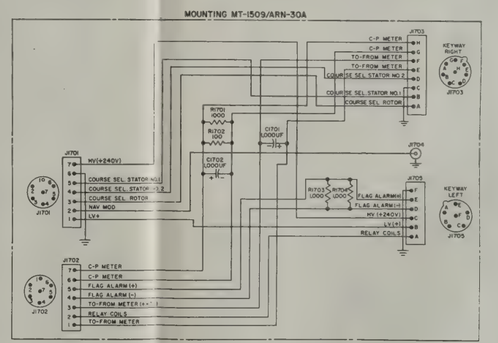
Figure 7-2. Radio Receiving Set AN/ARN-30B, Schematic Diagram



NOTES:
1. ALL CONNECTORS ARE SHOWN AS SEEN FROM WIRED SIDE.
2. ALL CAPACITOR VALUES ARE IN MICROMICROFARADS (UUF), UNLESS FOLLOWED BY "UF" - MICROFARADS.
3. ALL RESISTOR VALUES ARE IN OHMS. MULTIPLIER K = 1000; MEG = 1,000,000.
4. ALL INDUCTOR VALUES ARE IN MICROHENRIES (UH), UNLESS FOLLOWED BY "MH" - MILLIHENRIES OR "H" - HENRY.
5. THE RECEIVER INTERMEDIATE FREQUENCY IS 15MC. (THE R-F OSCILLATOR FREQUENCY IS 15MC LESS THAN THE R-F SIGNAL FREQUENCY.)
6. THE D-C VOLTAGES SHOWN ON THE RECEIVER SCHEMATIC ARE APPROXIMATE AND ARE BASED ON THE FOLLOWING CONDITIONS:
   (A) NEGATIVE TERMINAL OF VOLTMETER USED GROUNDED TO CHASSIS.
   (B) THE LOW VOLTAGE (-) AT TERMINAL 2 OF J104 SET AT 27 VOLTS BY ADJUSTMENT OF THE PRIMARY POWER SOURCE.
   (C) THE SENSITIVITY LINE (TERMINAL 3 OF J103) GROUNDED: NO SIGNAL INPUT.
   (D) EITHER MULTIMETER TS-352/U (30,000 OHMS-PER-VOLT) OR TS-297/U (1000 OHMS-PER-VOLT) USED, EXCEPT WHERE SPECIFICALLY INDICATED.
   (E) VOLTAGES IN PARENTHESES ARE THOSE OBTAINED WHEN DYNAMOTOR DY-86/ARN-30 SUPPLIES 130MA TO A TRANSMITTER (SUCH AS RADIO TRANSMITTER T-368A/ARC OR T-363A/ARC) CONNECTED TO J105; NO RECEIVER CURRENT DRAIN.
   (F) VOLTAGES SHOWN WILL BE LOWERED APPROXIMATELY 5 PER CENT WHEN THE DYNAMOTOR SUPPLIES 145MA TO THE CONVERTER IN ADDITION TO THE NORMAL RECEIVER DRAIN OF 70MA.
7. THE VALUES OF R130 AND R141 ARE SELECTED AT TIME OF FINAL FACTORY ADJUSTMENT FROM THE FOLLOWING RANGES:
   R130 0 to 2MEG
   R141 56K to 180K
8. THE D-C VOLTAGES SHOWN ON THE CONVERTER SCHEMATIC WERE OBTAINED USING MULTIMETER TS-352/U (20,000 OHMS-PER-VOLT), AND ARE APPROXIMATE, WITH POWER SUPPLIED BY THE DYNAMOTOR ON THE RECEIVER.
9. TYPICAL A-C VOLTAGES FOR THE CONVERTER WERE OBTAINED WITH ELECTRONIC MULTIMETER ME-88/U, OR EQUIVALENT, AND ARE MEASURED TO GROUND WITH THE EXCEPTION OF T201 AND T202 SECONDARY VOLTAGES WHICH WERE MEASURED TO THE COMMON CENTER-TAP.
10. TYPICAL CONVERTER PHASE ANGLES OF VARIOUS 30 CPS VOLTAGES ARE MEASURED WITH RESPECT TO THE A-F INPUT VOLTAGE, MEASURED ON COURSE "TO". COURSE SELECTOR SET AT 189 DEGREES.
11. R233 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 30K OHMS; ITS PURPOSE IS TO MINIMIZE QUADRANTAL ERRORS.
12. R238 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 8200 TO 20K OHMS; ITS PURPOSE IS TO ADJUST THE VARIABLE CHANNEL OUTPUT.
13. C210 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 10,000 UUF; ITS PURPOSE IS FOR PHASE ADJUSTMENT.
14. WITH SHUNT RESISTORS R302, R303, AND R304 AS SHOWN, THE EQUIPMENT IS ADJUSTED TO FEED ONE VERTICAL POINTER AND ONE FLAG. FOR EACH ADDITIONAL VERTICAL POINTER (OR EQUIVALENT LOAD SUCH AS A ZERO READER) REMOVE EITHER R301 OR R302. FOR EACH ADDITIONAL FLAG LOAD, REMOVE EITHER R303 OR R304.
15. VALUE OF R702 SELECTED BETWEEN 0 AND 270 OHMS TO PRODUCE A TOTAL RESISTANCE, BETWEEN TERMINALS A AND C OF J701, OF 2080 (±30) OHMS AT +25° C (+77° F).
16. RADIO SET CONTROL C-984/ARN-30 AND RADIO SET CONTROL C-1254/ARN-30 ARE INTERCHANGEABLE.
17. FOR APPLICABLE WIRING DIAGRAMS SEE FIGURES 7-4, 7-5, 7-8, 7-9 7-10, AND 7-11.







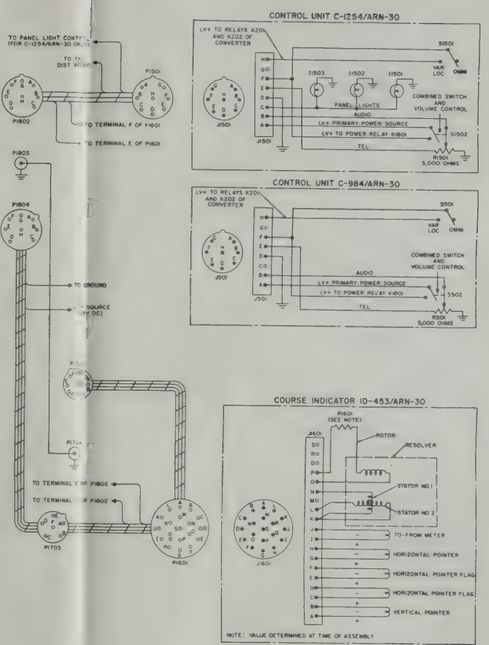
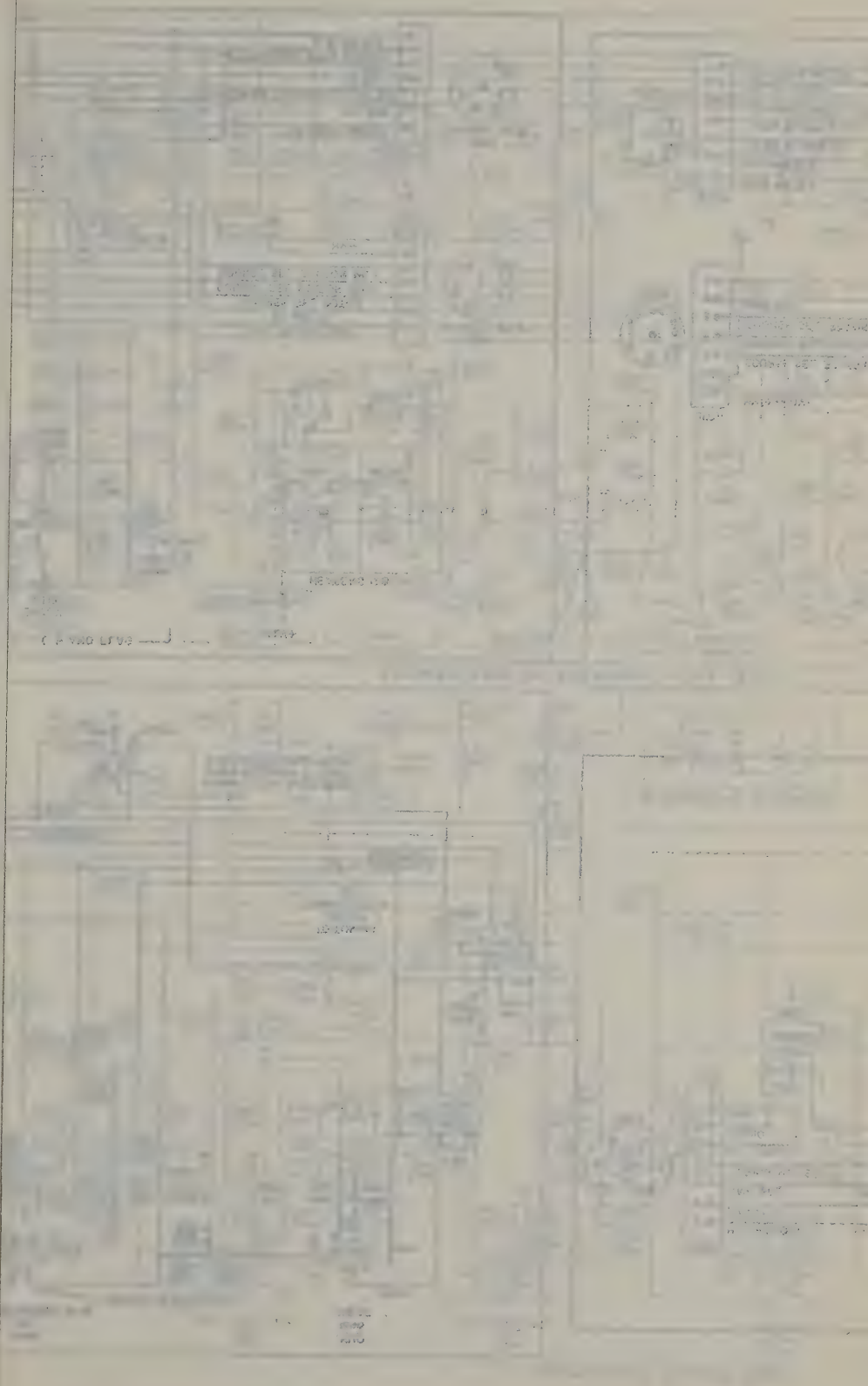


Figure 7-3. Radio Receiving Set AN/ARN-30C, Schematic Diagram



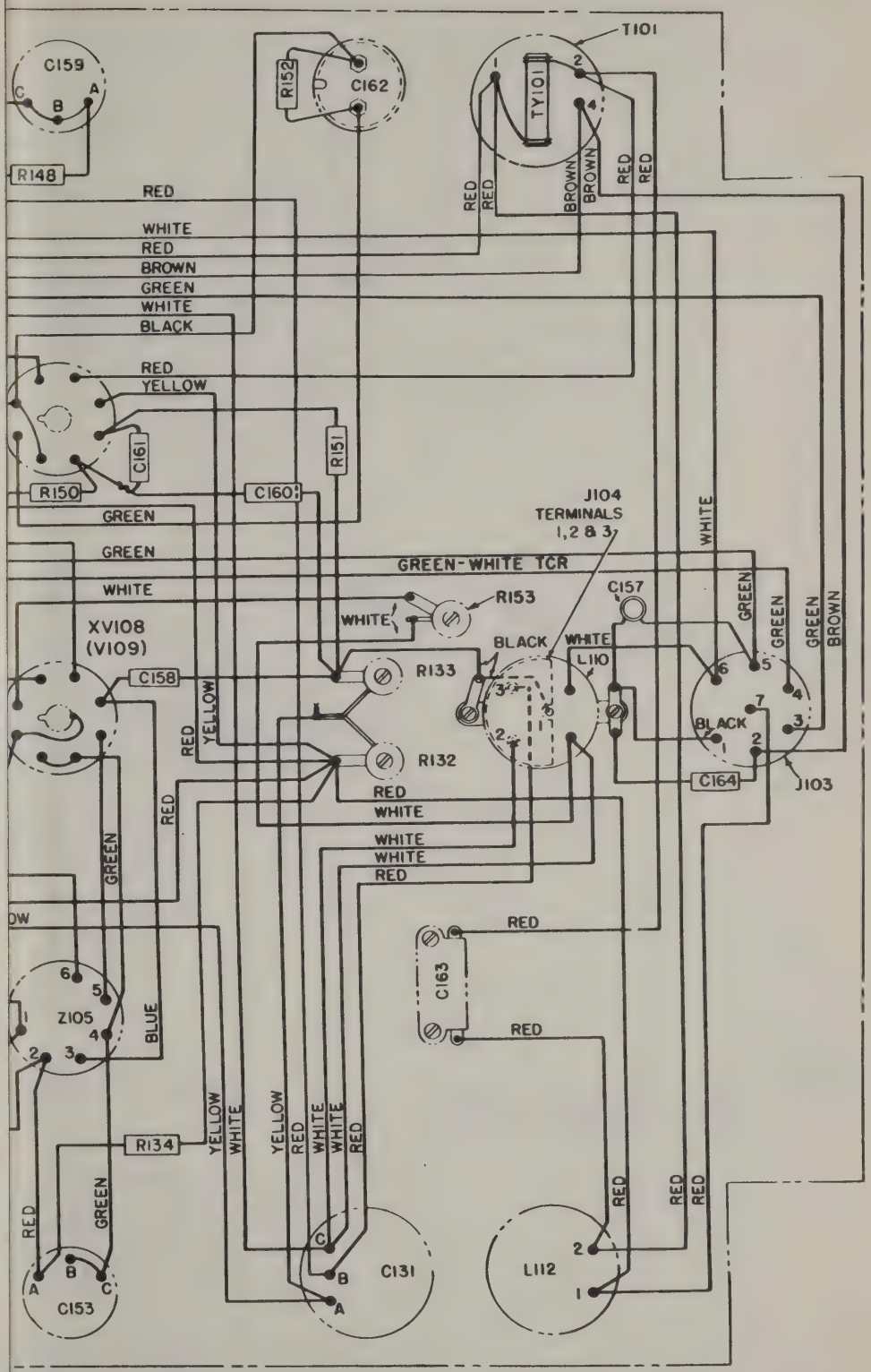
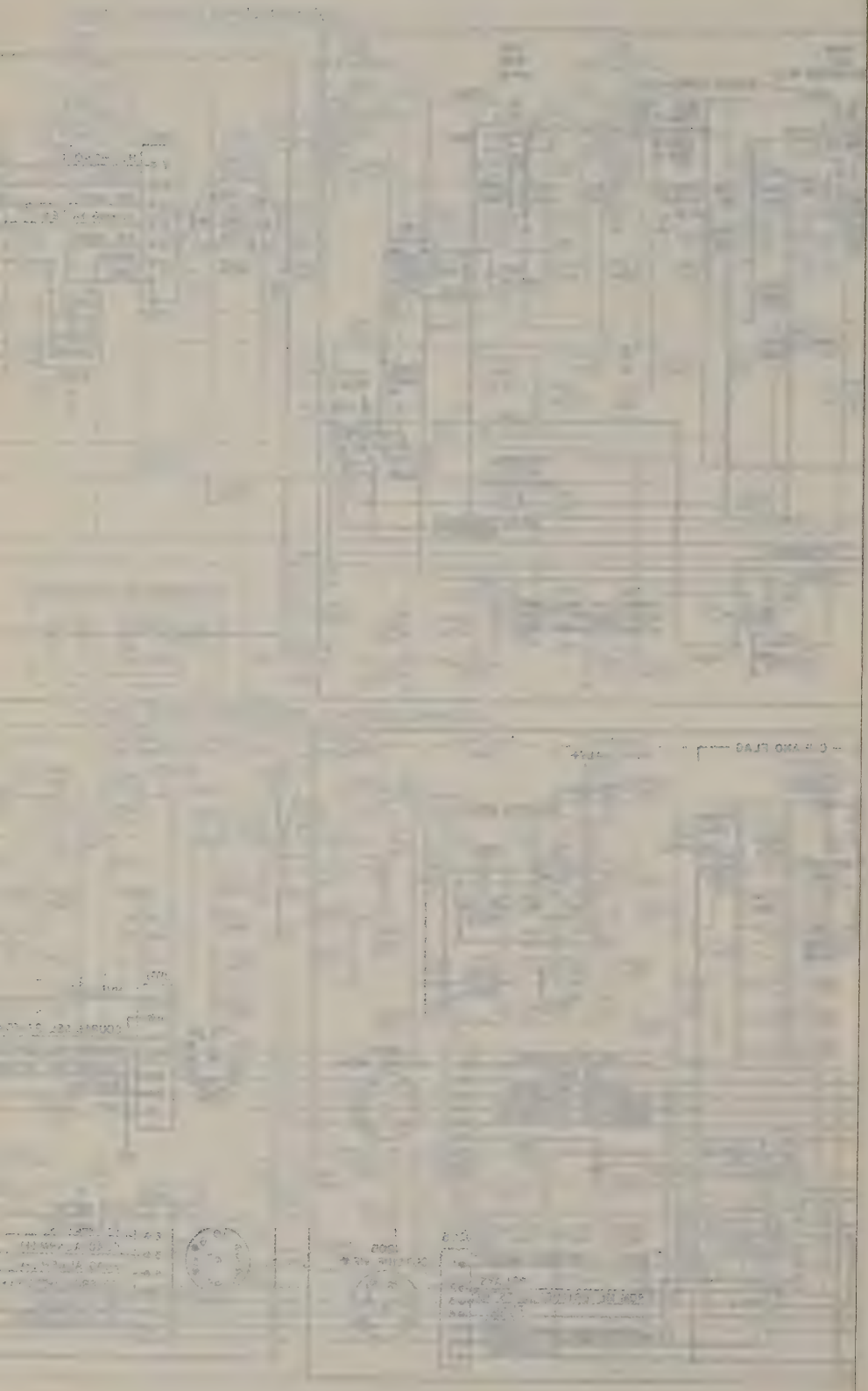
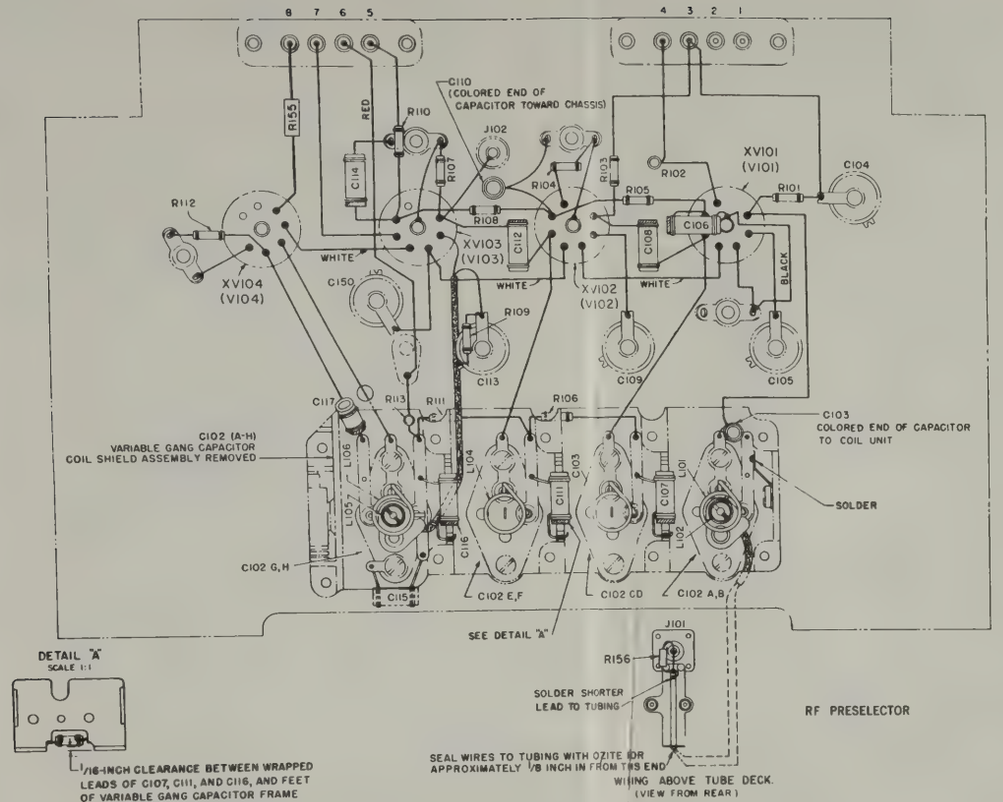


Figure 7-4. Radio Receiver R-445/ARN-30, Wiring Diagram





NOTES:

1. ALL WIRES MARKED WITH COLOR NOTE ARE NO. 22 SOLID COPPER, VINYLITE INSULATED.
2. ALL UNMARKED WIRES ARE NO. 22 BARE TINNED SOLID COPPER, EXCEPT THOSE OF PRESELECTOR Z101, WHICH ARE NO. 24, UNLESS OTHER WISE MARKED.
3. VINYLITE TUBING OF APPROPRIATE SIZE IS INSTALLED OVER LEADS MARKED "T".
4. SHADED AREA ON CERAMIC CAPACITORS INDICATE COLORED END.
5. THE VALUES OF R130 AND R141 ARE SELECTED AT THE TIME OF FINAL FACTORY ADJUSTMENT FROM THE FOLLOWING RANGES:
   R130 0 TO 2MEG R141 56K TO 180K
6. FOR SCHEMATIC DIAGRAM SEE FIGURE 7-1, 7-2 AND 7-3.

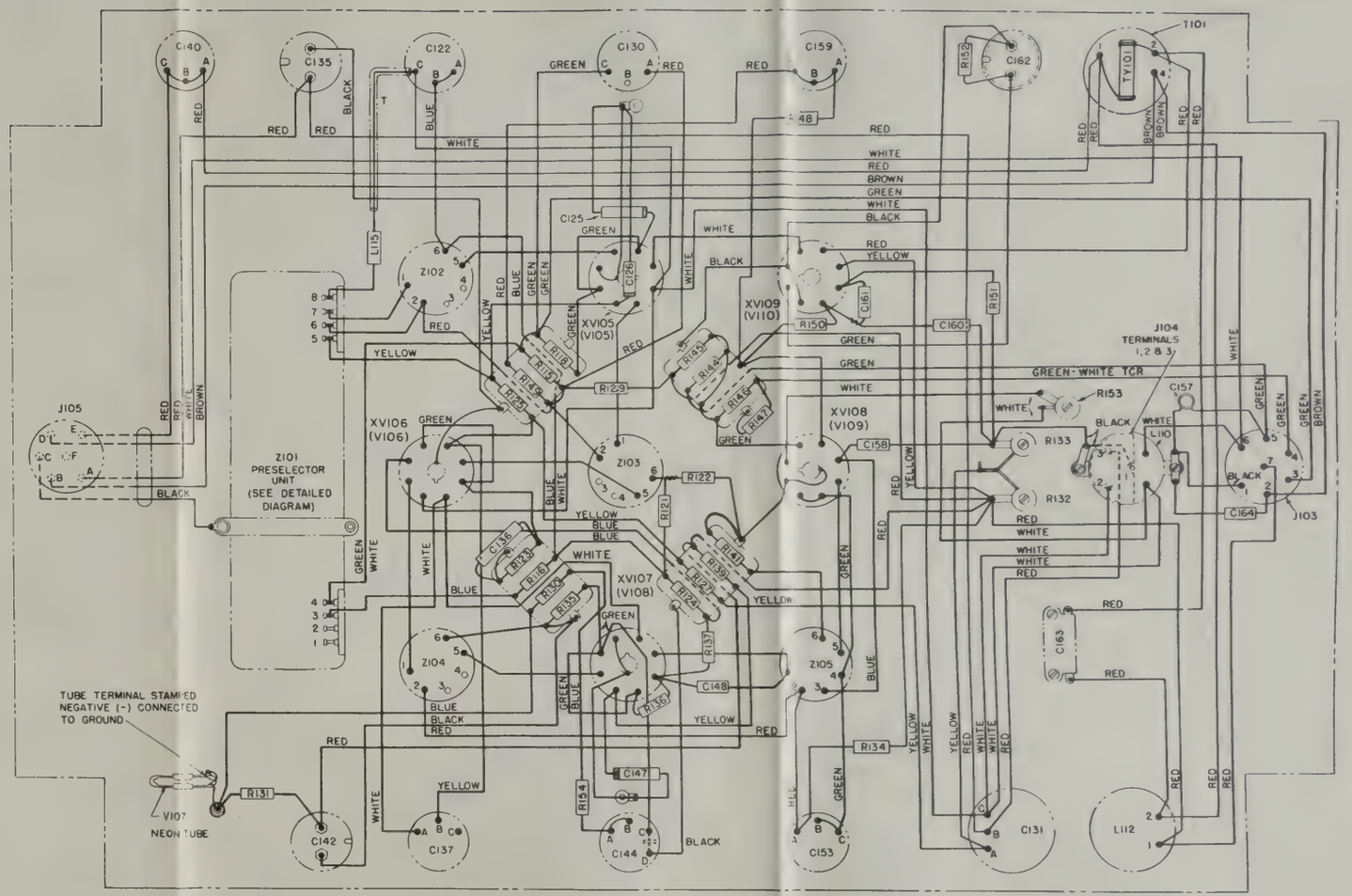
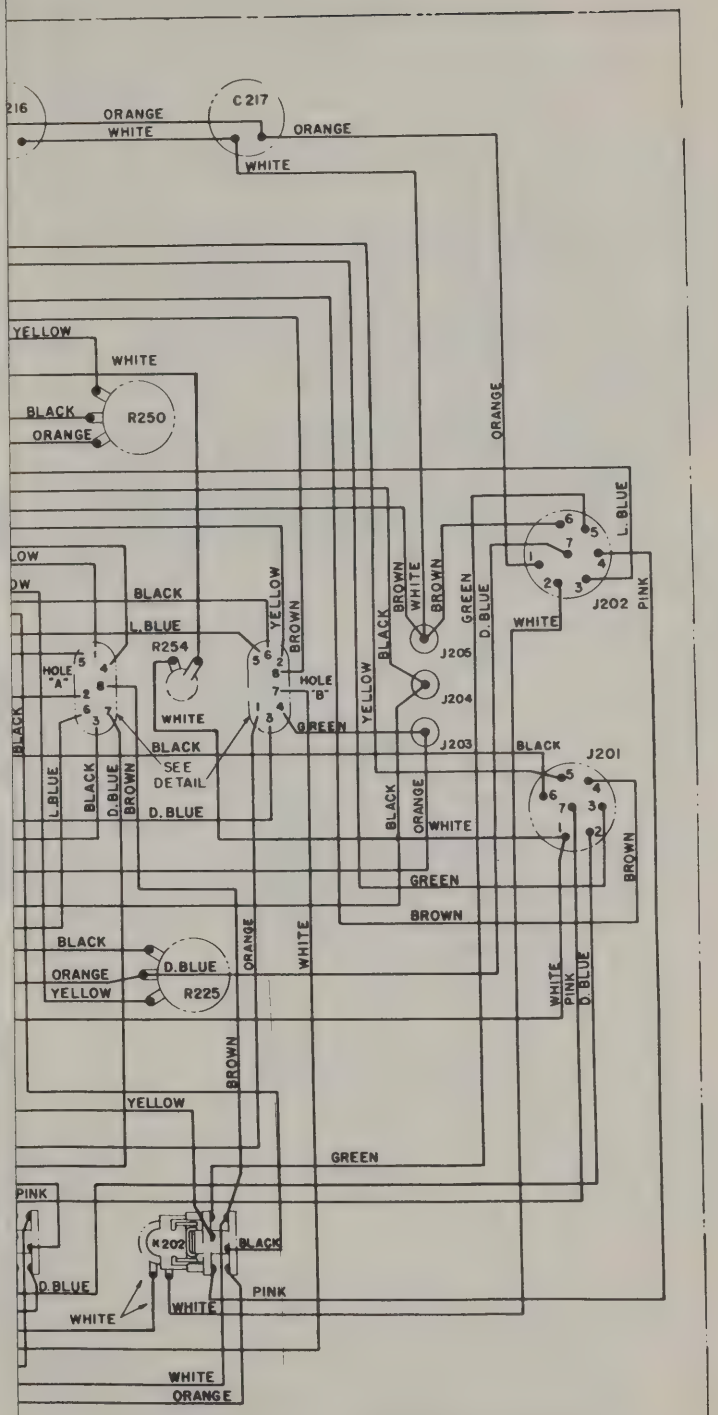


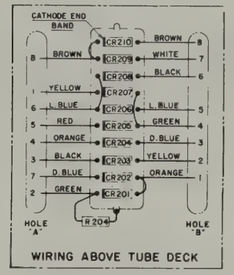
Figure 7-4. Radio Receiver R-445/ARN-30, Wiring Diagram



er CV-265/ARN-30A, Wiring Diagram

NOTES:

1. ALL WIRES MARKED WITH COLOR NOTE ARE NO. 22 SOLID COPPER, VINYLITE INSULATED.
2. ALL UNMARKED WIRES ARE NO. 22 BARE TINNED SOLID COPPER.
3. WIRES MARKED WITH AN ASTERISK (*) MUST BE DIRECTLY AGAINST CHASSIS.
4. R233 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 20K OHMS: ITS PURPOSE IS TO MINIMIZE QUADRANTAL ERRORS.
5. R236 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 8200 TO 20K OHMS: ITS PURPOSE IS TO ADJUST THE VARIABLE CHANNEL OUTPUT.
6. C210 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY ADJUSTMENT WITH LIMITING VALUE OF 0 TO 10,000 UUF: ITS PURPOSE IS FOR PHASE ADJUSTMENT.
7. FOR SCHEMATIC DIAGRAM, SEE FIGURE 7-1.



WIRING ABOVE TUBE DECK

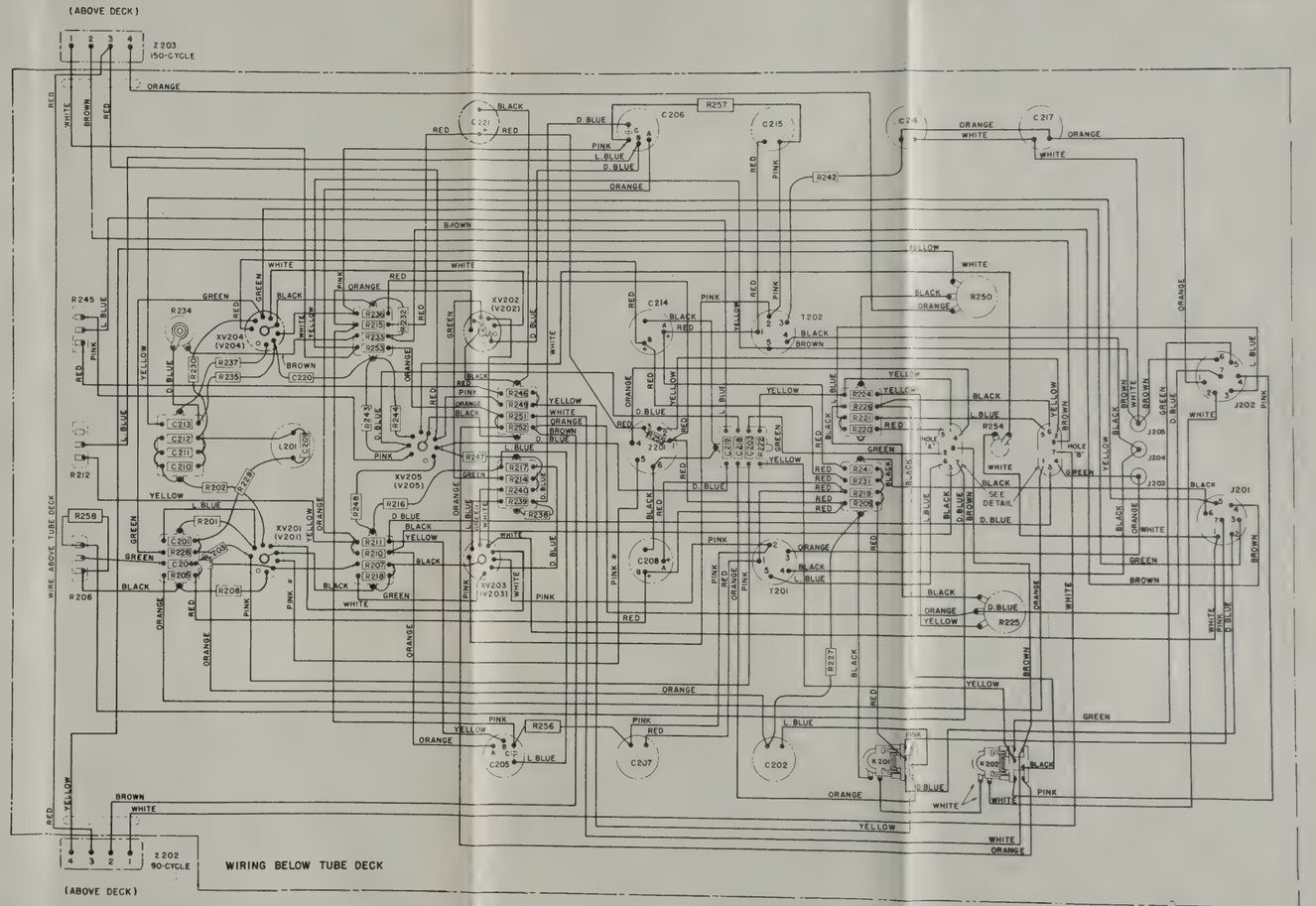
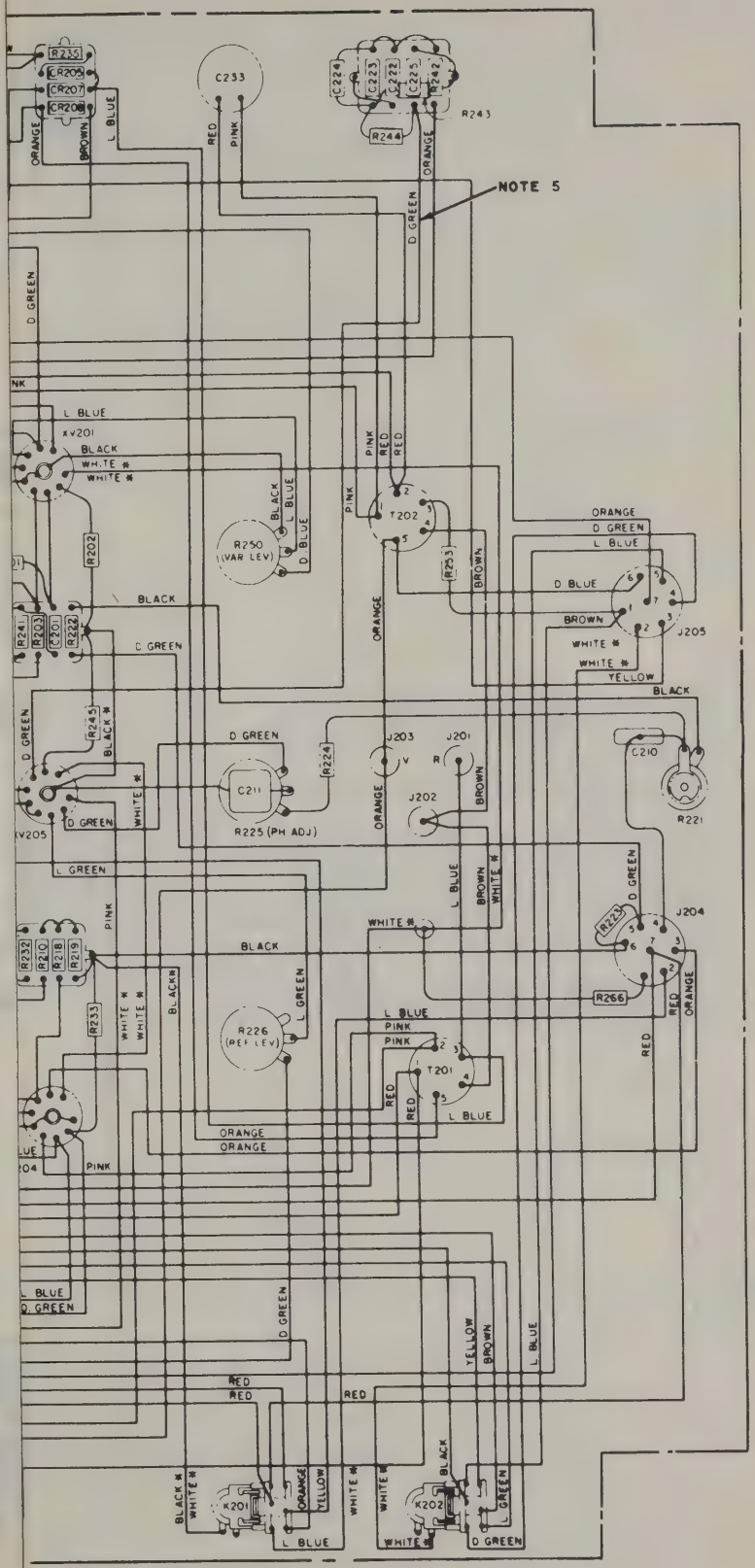


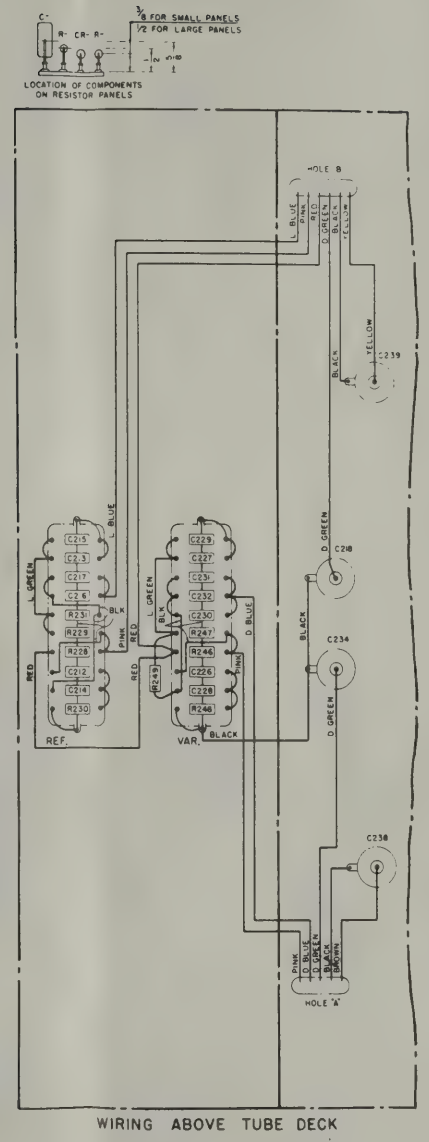
Figure 7-5. Signal Data Converter CV-265/ARN-30A, Wiring Diagram



Converter CV-265A/ARN-30A, Wiring Diagram

NOTES:

1. ALL WIRES MARKED WITH COLOR NOTE ARE NO. 24, VINYLITE INSULATION EXCEPT THOSE MARKED WITH AN ASTERISK (*), WHICH ARE NO. 22 VINYLITE INSULATION.
2. ALL UNMARKED WIRES ARE NO. 22 BARE TINNED COPPER.
3. R222 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY OR OVERHAUL ADJUSTMENT, WITH LIMITING VALUE OF 0 TO 20K OHMS.
4. C240 IS SELECTED AND INSTALLED AT TIME OF FINAL FACTORY OR OVERHAUL ADJUSTMENT, WITH THE BEST RMA VALUES BETWEEN 0 AND .002 UF.
5. LAY WIRE DIRECTLY AGAINST CHASSIS.
6. FOR SCHEMATIC DIAGRAM SEE FIGURES 7-2 AND 7-3.



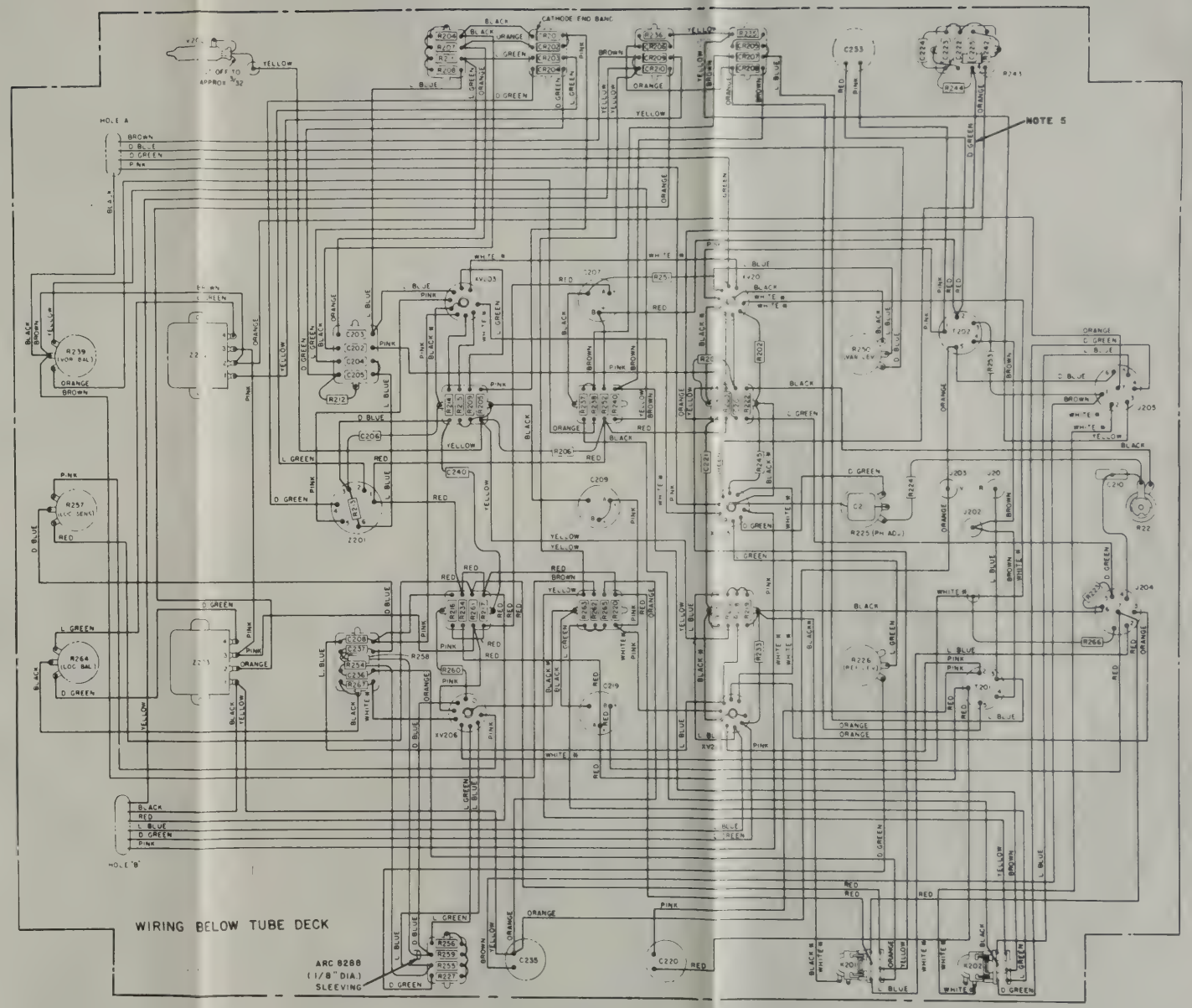
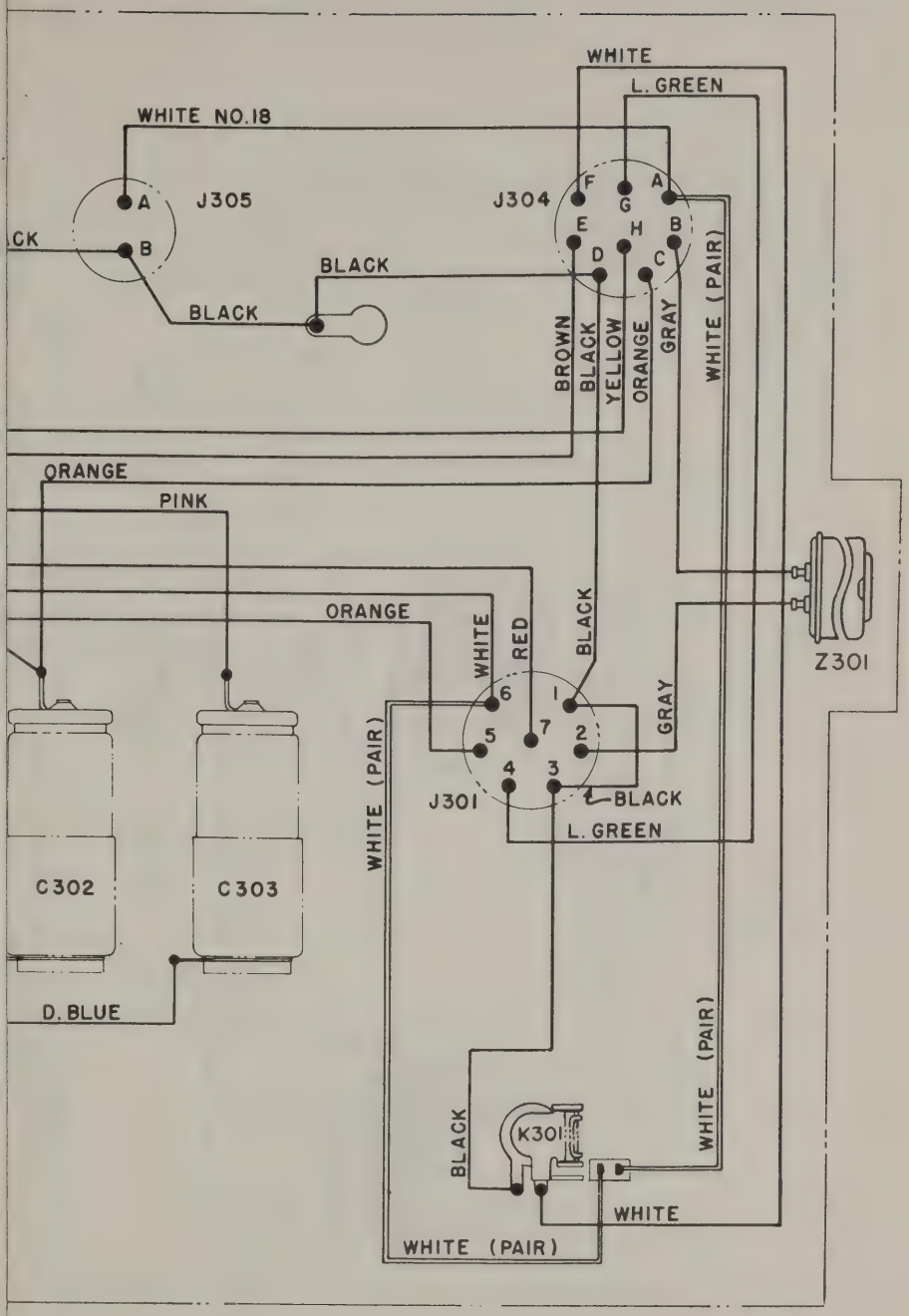
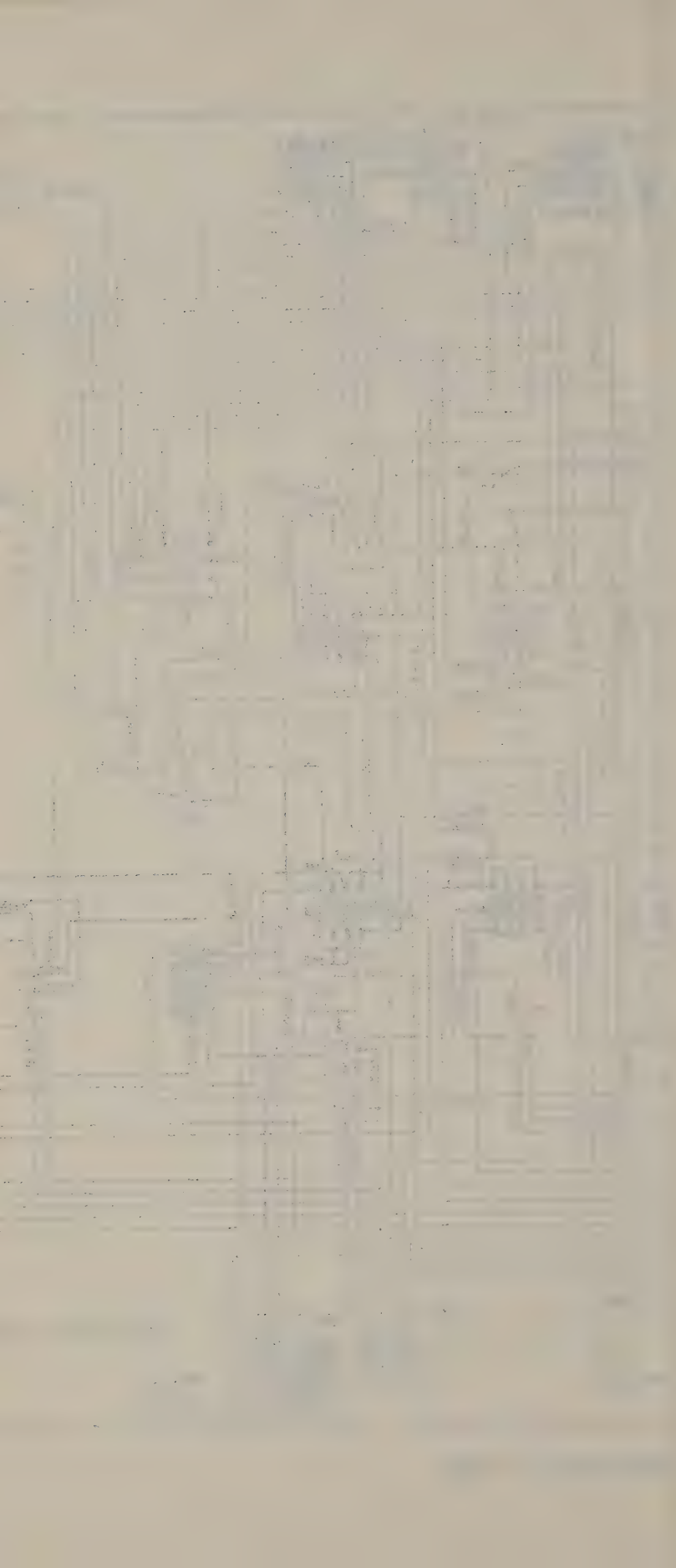


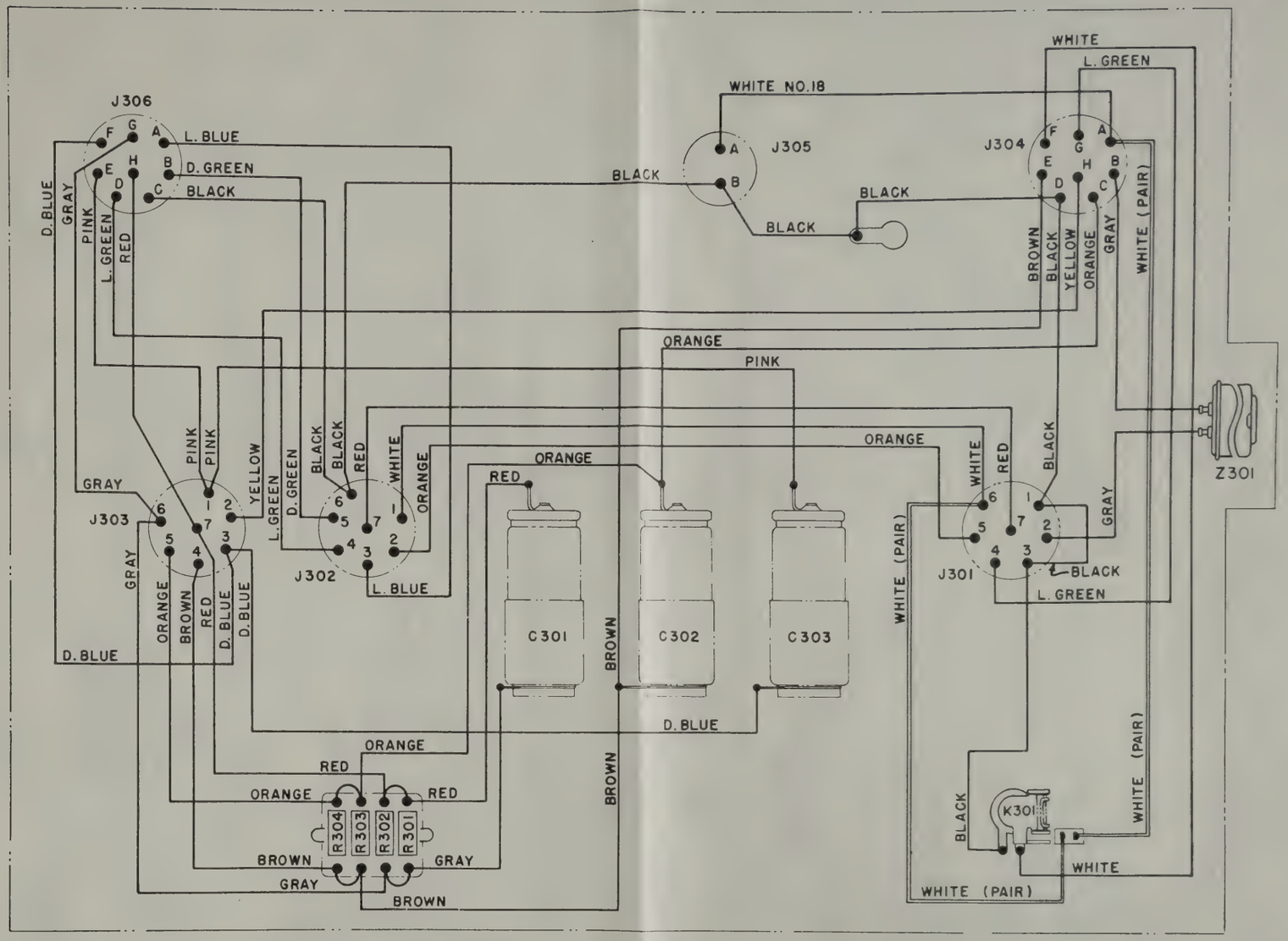
Figure 7-6. Signal Data Converter CV-265A/ARN-30A, Wiring Diagram



NO. 18 STRANDED COPPER
ER WIRE), VINYLITE INSULATED.
LID COPPER, VINYLITE INSULATED.
AND R304 INSTALLED AS SHOWN,
DJUSTED TO FEED ONE VERTICAL
, THAT IS ONE ID-48/ARN. FOR
TER (OR EQUIVALENT LOAD SUCH
RESISTOR, EITHER R301 OR R302.
FLAG LOAD OF A VERTICAL
EITHER R303 OR R304.
GURES 7-1 AND 7-2.

7-7. Mounting MT-1175/ARN-30A, Wiring Diagram

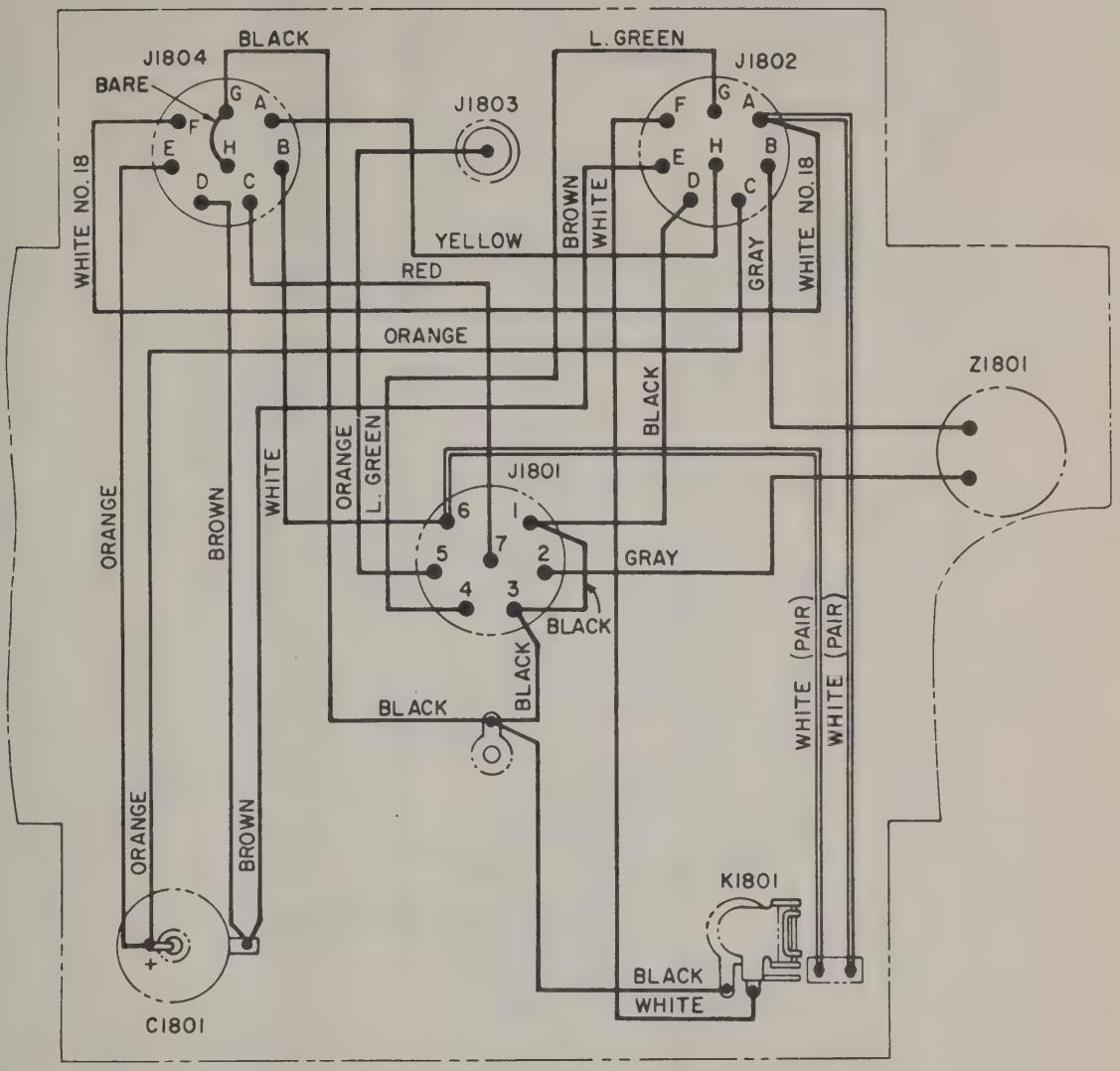




NOTES:

1. ALL WIRES MARKED "NO. 18" ARE NO. 18 STRANDED COPPER (16 STRANDS NO. 30 TINNED COPPER WIRE), VINYLITE INSULATED.
2. ALL OTHER WIRES ARE NO. 22 SOLID COPPER, VINYLITE INSULATED.
3. WITH RESISTORS R301, R302, R303, AND R304 INSTALLED AS SHOWN, THE COMPLETE AN/ARN-30A IS ADJUSTED TO FEED ONE VERTICAL POINTER AND ONE WARNING FLAG, THAT IS ONE ID-48/ARN. FOR EACH ADDITIONAL VERTICAL POINTER (OR EQUIVALENT LOAD SUCH AS A ZERO READER) REMOVE ONE RESISTOR, EITHER R301 OR R302. FOR EACH ADDITIONAL WARNING FLAG LOAD OF A VERTICAL POINTER, REMOVE ONE RESISTOR, EITHER R303 OR R304.
4. FOR SCHEMATIC DIAGRAM, SEE FIGURES 7-1 AND 7-2.

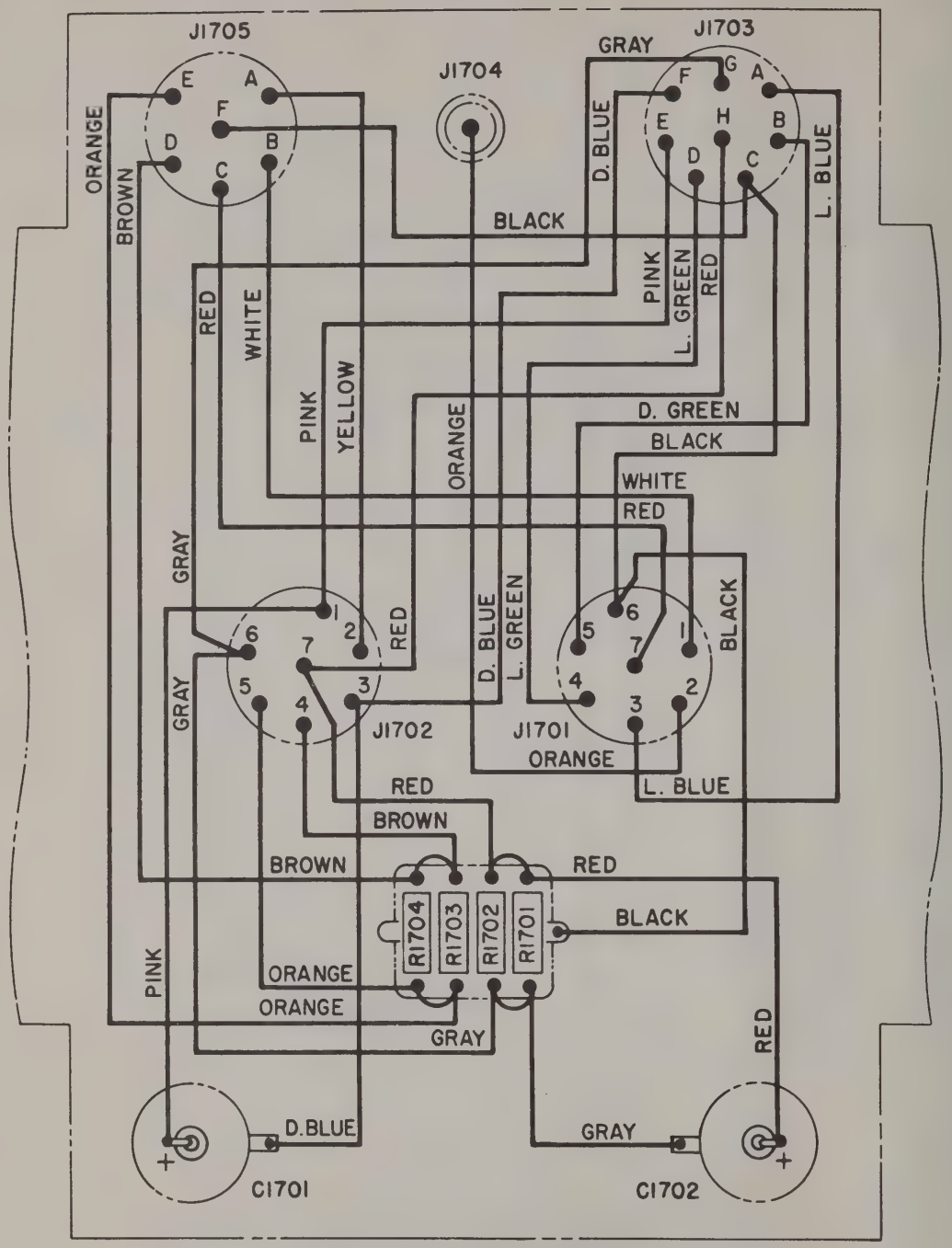
Figure 7-7. Mounting MT-1175/ARN-30A, Wiring Diagram



NOTES:

1. CONNECTIONS ARE SHOWN FROM WIRED SIDE OF CONNECTORS.
2. ALL WIRES ARE NO. 22 SOLID COPPER.
3. FOR SCHEMATIC DIAGRAM SEE FIGURE 4-16.

Figure 7-8. Mounting MT-1508/ARN-30A, Wiring Diagram



NOTES:

1. CONNECTIONS ARE SHOWN FROM WIRED SIDE OF CONNECTORS.
2. ALL WIRES ARE NO. 22 SOLID COPPER.
3. FOR SCHEMATIC DIAGRAM SEE FIGURE 4-17.

Figure 7-9. Mounting MT-1509/ARN-30A, Wiring Diagram

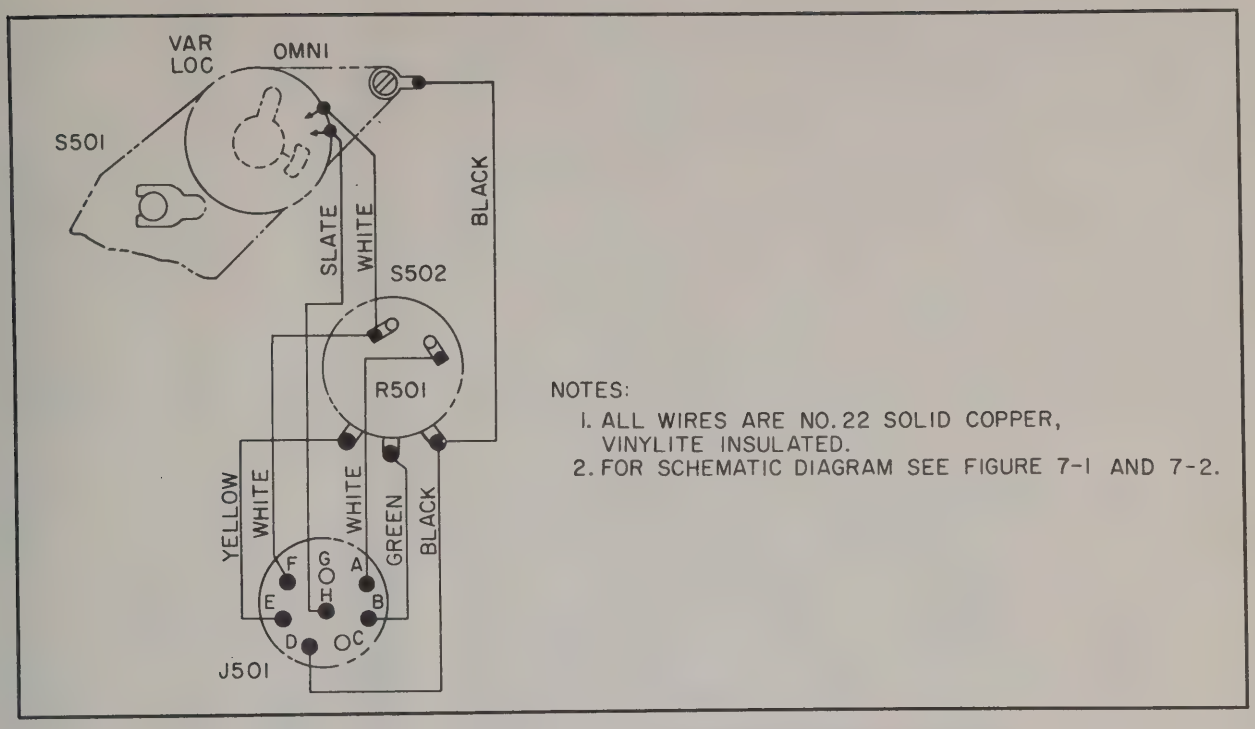


Figure 7-10. Radio Set Control C-984/ARN-30, Wiring Diagram

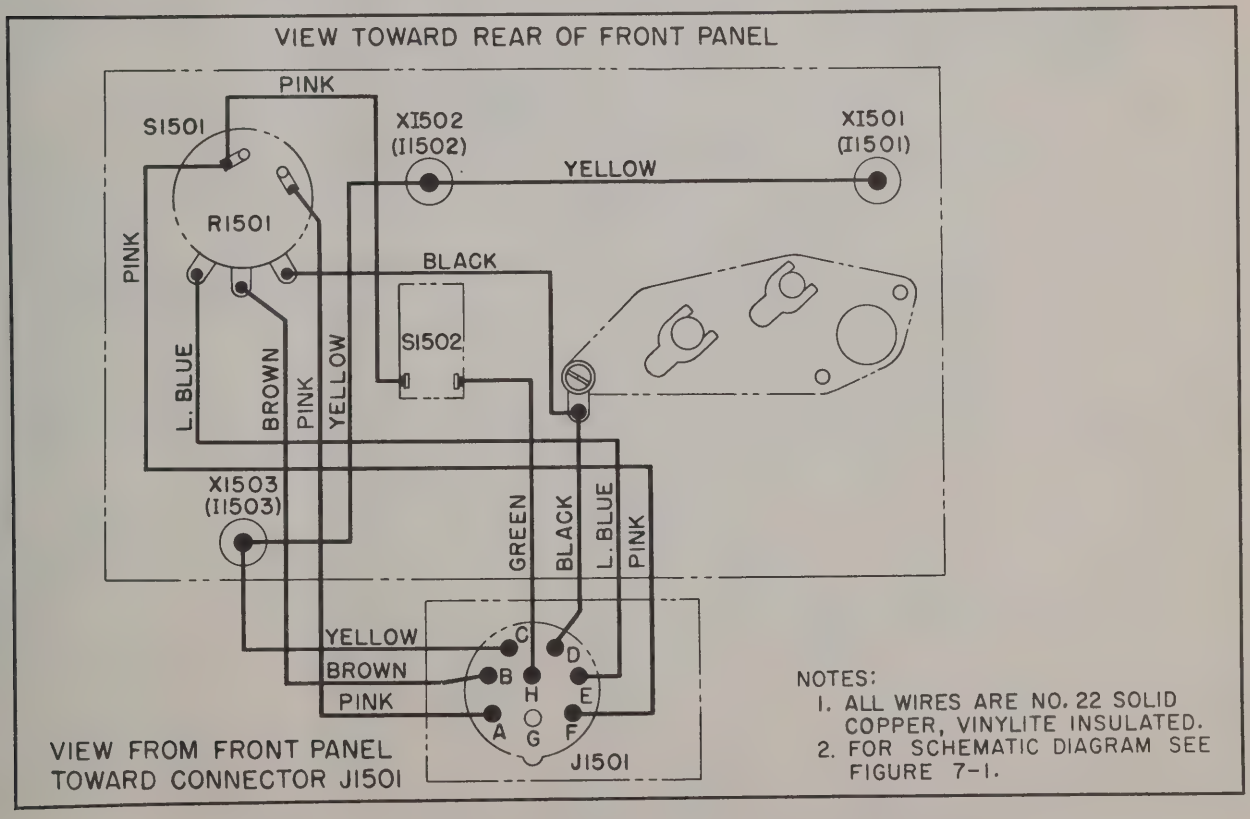


Figure 7-11. Radio Set Control C-1254/ARN-30, Wiring Diagram

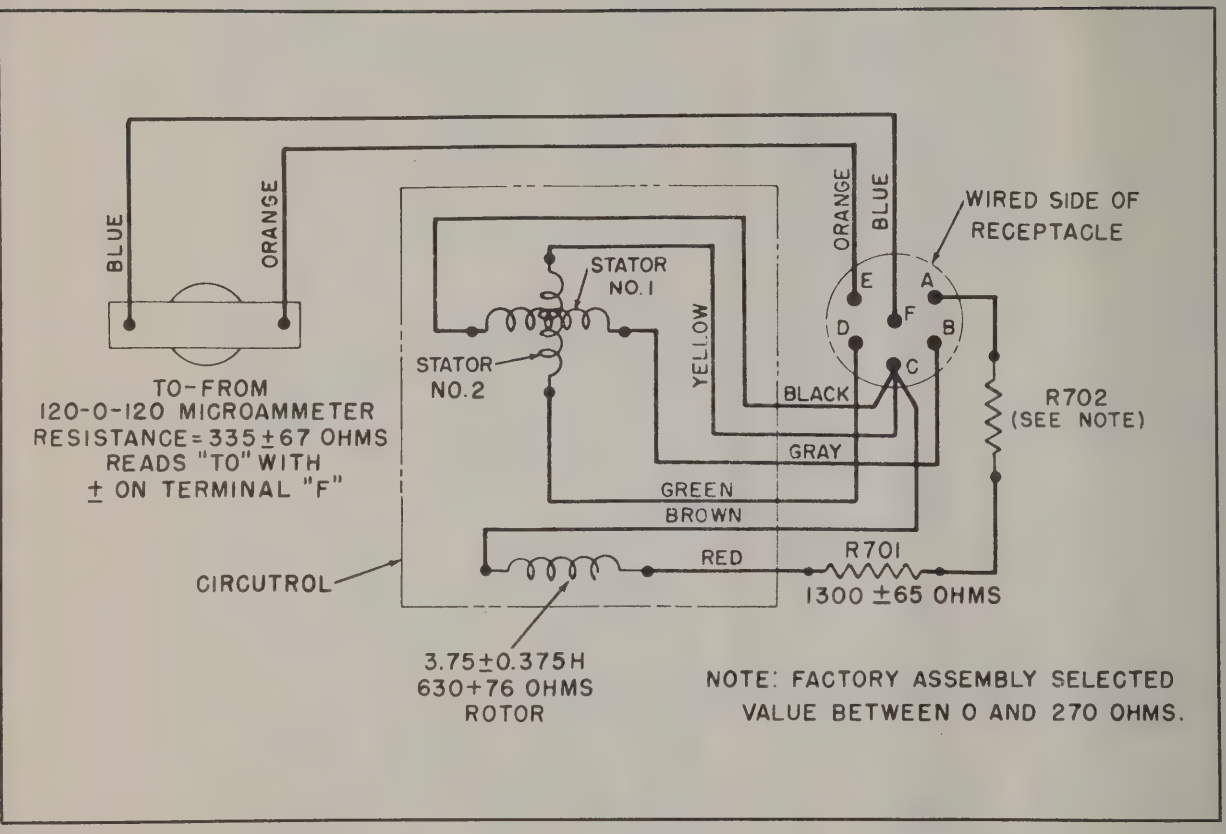
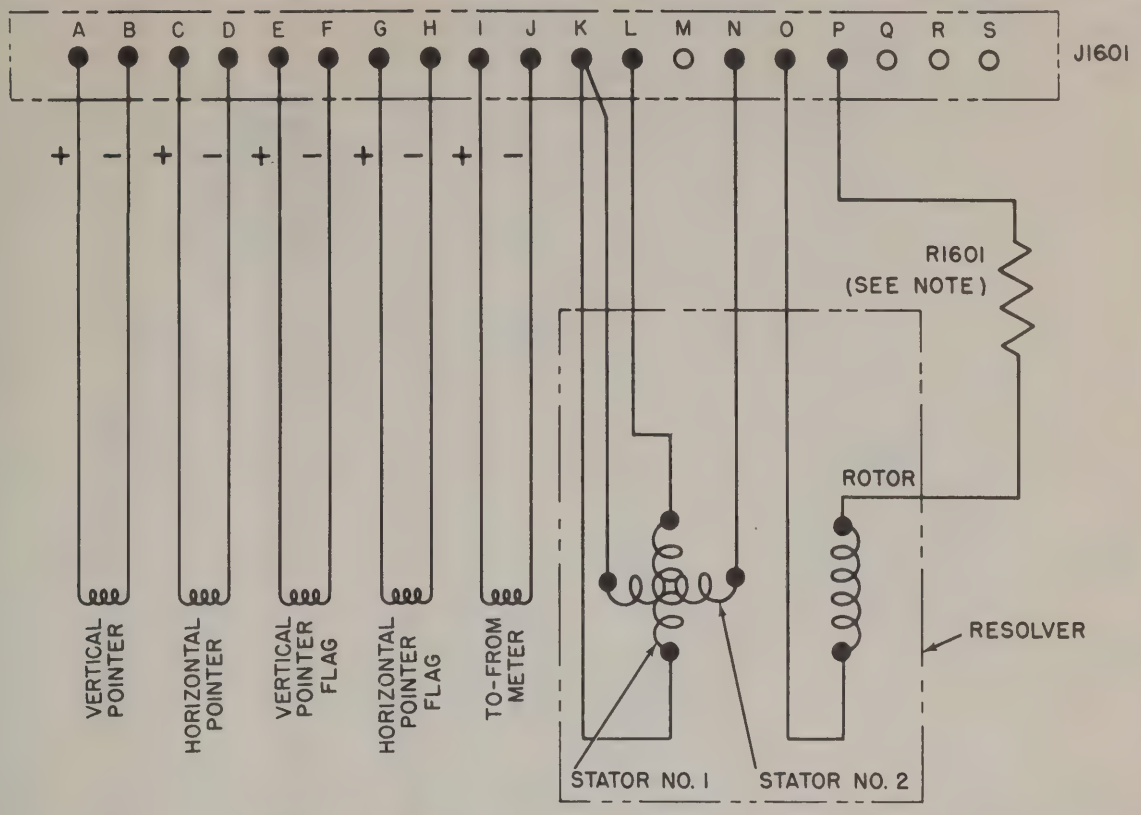


Figure 7-12. Course Indicator ID-322/ARN-30, Wiring Diagram



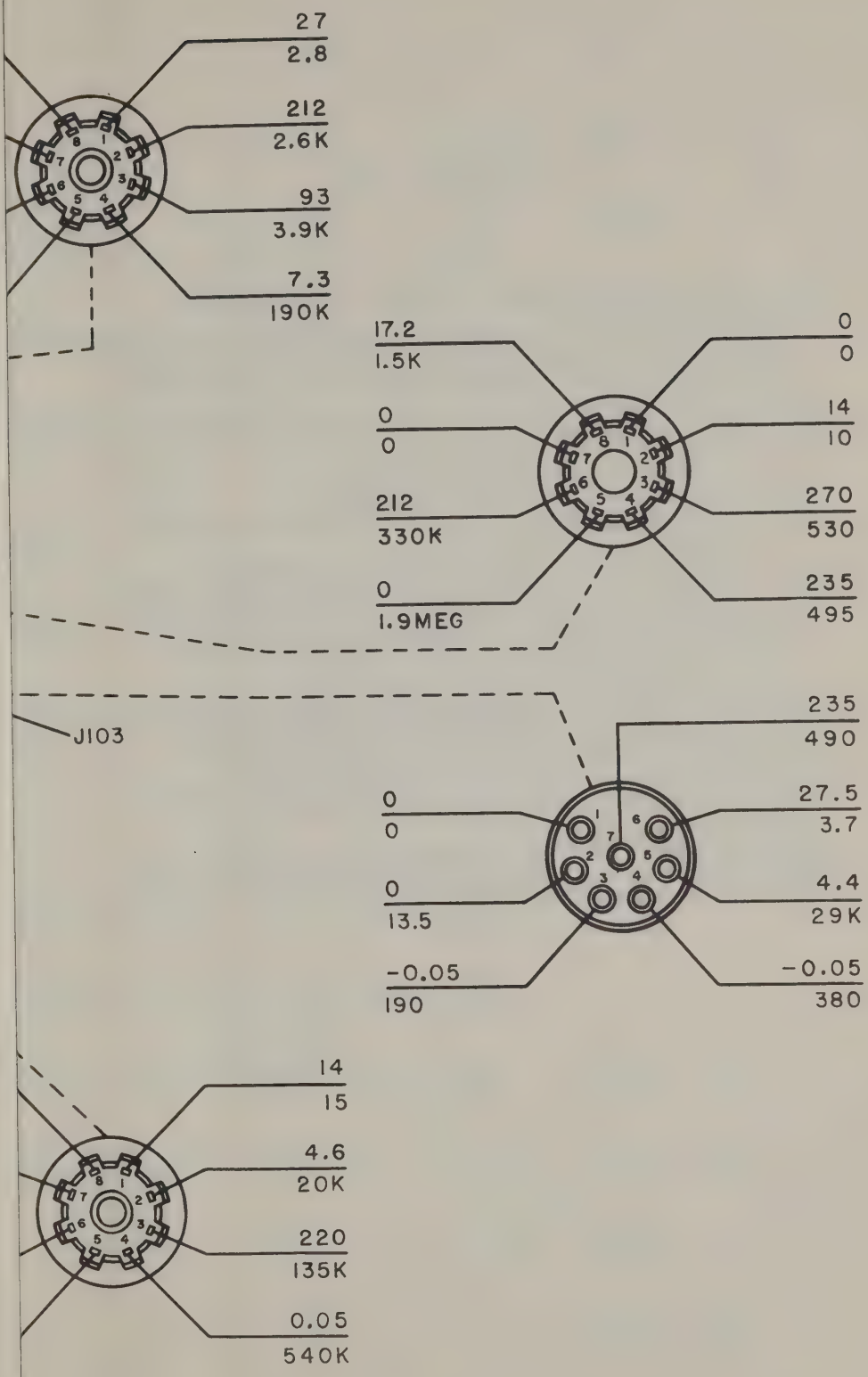
MECHANISM	RECEPTACLE PINS +	RECEPTACLE PINS -	DEFLECTION	SENSITIVITY MICROAMPERES	RESISTANCE OHMS
VERTICAL POINTER	A	B	RIGHT	150-0-150 ±7.5	1000 ±30
HORIZONTAL POINTER	C	D	DOWN	150-0-150 ±7.5	1000 ±30
VERTICAL POINTER FLAG	E	F	DOWN	125 ±6.25 SUPPRESSED 250 ±12.5 CONCEALED	1000 ±30
HORIZONTAL POINTER FLAG	G	H	RIGHT	125 ±6.25 SUPPRESSED 250 ±12.5 CONCEALED	1000 ±30
TO-FROM METER	I	J	TO	90-0-90 ±15	335 ±67

RESOLVER SYNCHRO	RECEPTACLE PINS		RESISTANCE OHMS
STATOR NO. 1	GREEN YELLOW	K L	1040 ±125
STATOR NO. 2	GREY BLACK	K N	1040 ±125
ROTOR CIRCUIT	RED WHITE	O P	2900 ±300

NOTE:

VALUE DETERMINED AT TIME OF ASSEMBLY.

Figure 7-13. Course Indicator ID-453/ARN-30, Wiring Diagram



Radio Receiver R-445/ARN-30, Terminal Voltage and Resistance Diagram

NOTES:

1. VIEW IS BOTTOM OF CHASSIS. ALL RECEPTACLES SHOWN AS SEEN FROM WIRED SIDE.
2. ALL VOLTAGES ARE D-C AND APPEAR ABOVE THE REFERENCE LINE.
3. ALL RESISTANCES IN OHMS UNLESS FOLLOWED BY "K" - KILOHM (1000 OHMS) OR "MEG" - MEGOHM (1,000,000 OHMS), AND APPEAR BELOW THE REFERENCE LINE.
4. ALL MEASUREMENTS ARE MADE WITH RESPECT TO GROUND AND ARE APPROXIMATE (TOLERANCE ±10%).
5. ALL D-C VOLTAGES TAKEN UNDER THE FOLLOWING CONDITIONS:
   a. DYNAMOTOR DY-86/ARN-30 CONNECTED.
   b. VOLTAGE AT TERMINAL A OF J101 SET AT NOMINAL SUPPLY VOLTAGE OF 28 VOLTS D-C.
   c. TERMINAL 3 OF J103 GROUNDED: NO SIGNAL INPUT.
   d. VOLTMETER SCALE: 500-VOLT SCALE FOR VOLTAGES ABOVE 50 VOLTS: 50-VOLT SCALE FOR VOLTAGES BELOW 50 VOLTS.
   e. MEASUREMENTS APPLY TO EITHER 20,000 OHMS-PER-VOLT OR 1000 OHMS-PER-VOLT, UNLESS INDICATED BY * FOR 20,000 OHMS-PER-VOLT.
   f. WIRED PLUG ARC-11934 (P101) CONNECTED TO J105.
6. RESISTANCE MEASUREMENTS MADE WITH DYNAMOTOR IN PLACE BUT RECEIVER DISCONNECTED FROM OTHER COMPONENTS.
7. MULTIMETER TS-352/U USED FOR ALL MEASUREMENTS.
8. VOLTAGE IN PARENTHESIS IS THAT OBTAINED WHEN DYNAMOTOR SUPPLIES 130 MA TO A TRANSMITTER CONNECTED TO J105; NO RECEIVER DRAIN.
9. VOLTAGES SHOWN WILL BE LOWERED APPROXIMATELY 5% WHEN DYNAMOTOR SUPPLIES 14 MA TO THE CONVERTER IN ADDITION TO THE NORMAL RECEIVER DRAIN OF 70 MA.

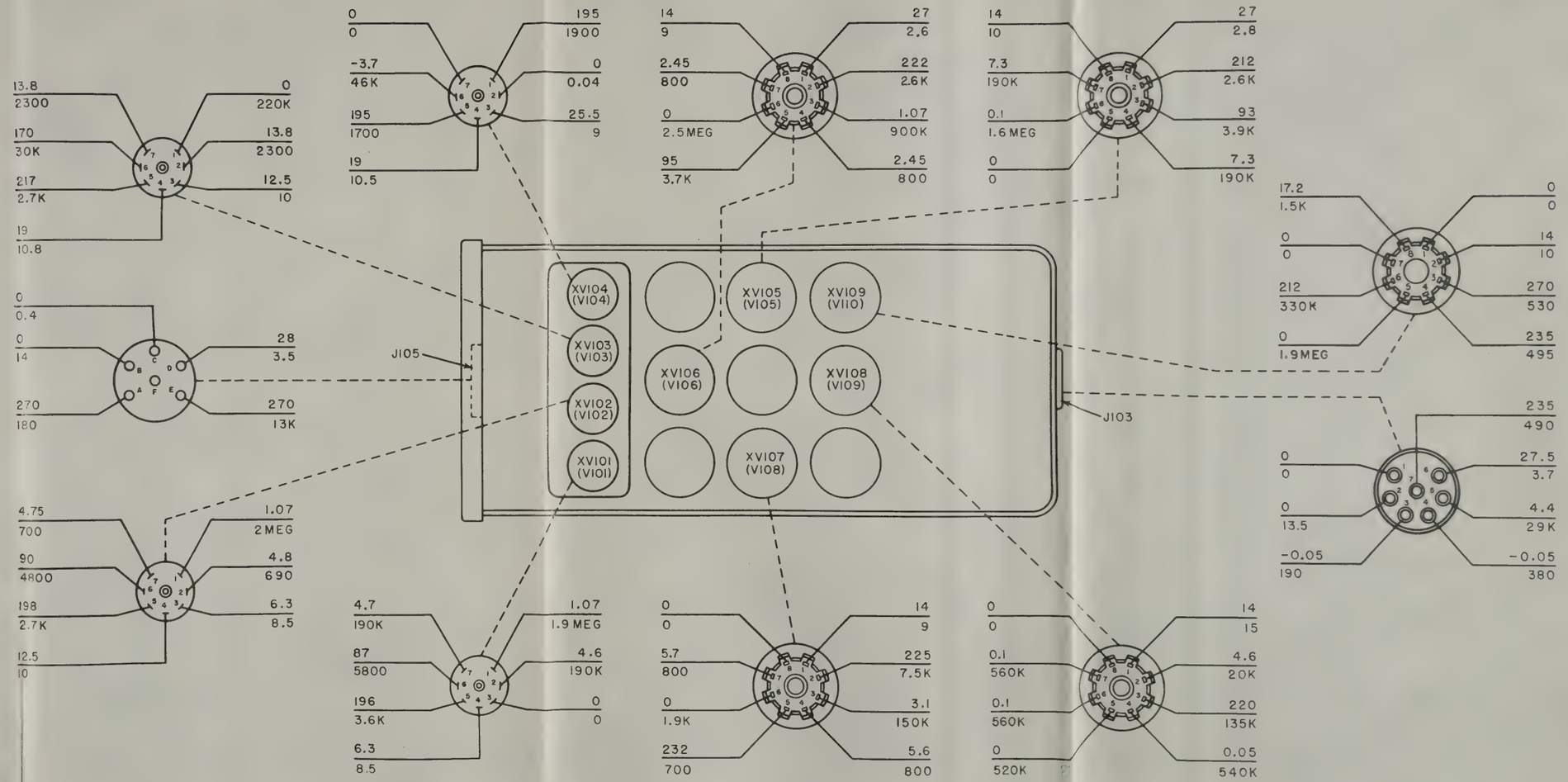
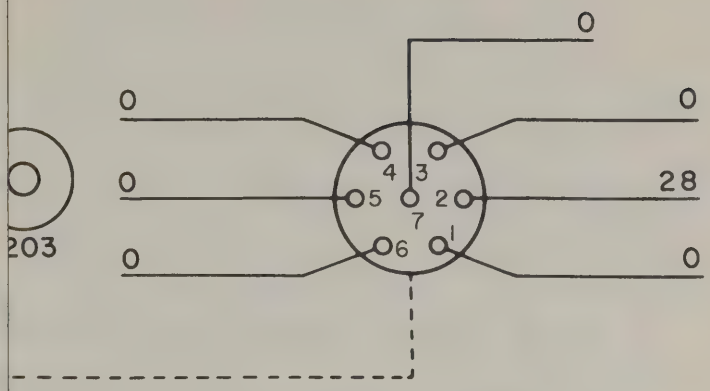
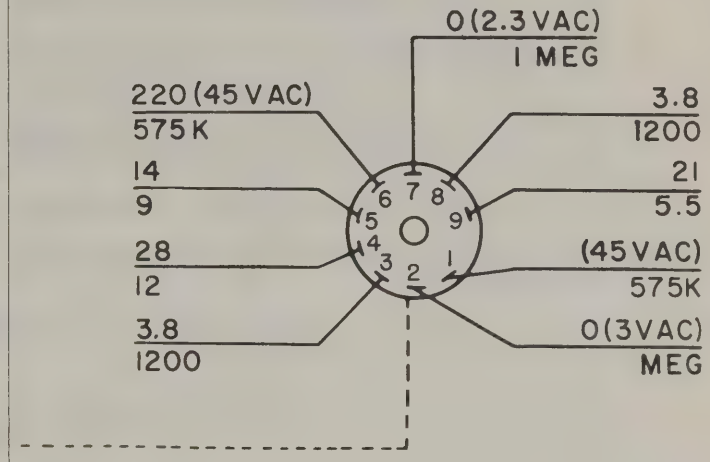
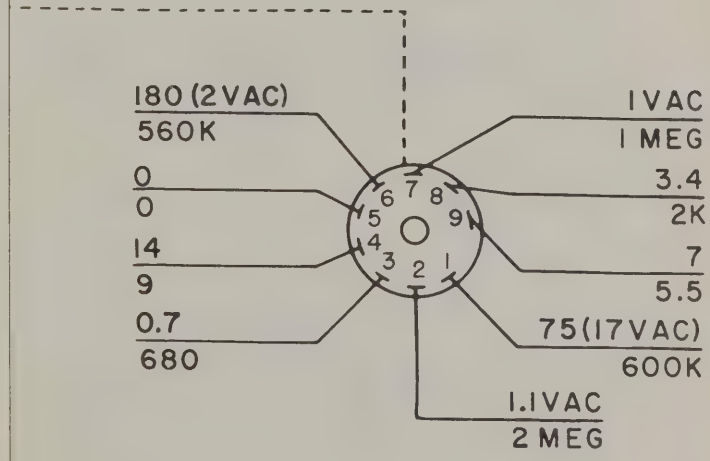


Figure 7-14. Radio Receiver R-445/ARN-30, Terminal Voltage and Resistance Diagram







65/ARN-30A, Terminal Voltage and Resistance Diagram

NOTES:

1. VIEW IS BOTTOM OF CHASSIS.
2. ALL VOLTAGES D-C UNLESS OTHERWISE NOTED AND APPEAR ABOVE THE REFERENCE LINE.
3. ALL RESISTANCE VALUES IN OHMS (MULTIPLIER K = 1000; MEG = 1,000,000) AND APPEAR BELOW THE REFERENCE LINE.
4. ALL MEASUREMENTS MADE WITH RESPECT TO GROUND EXCEPT J203 AND J205 WHICH ARE MADE WITH RESPECT TO J204.
5. RESISTANCE MEASUREMENTS MADE WITH SIGNAL DATA CONVERTER CV-265/ARN-30A DISCONNECTED FROM SET.
6. MULTIMETER TS-352/U USED FOR ALL D-C MEASUREMENTS.
7. ELECTRONIC MULTIMETER ME-6B/U USED FOR ALL A-C MEASUREMENTS.
8. UP TO 0.6 VOLTS A-C DEPENDING ON SETTING OF COURSE SELECTOR.
9. INFINITE OR 535K DEPENDING ON POLARITY OF MULTIMETER TEST LEADS.
10. 2.2 VOLTS A-C WITH OMNI-VAR LOC SWITCH AT OMNI; 1.7 VOLTS A-C WITH OMNI-VAR LOC SWITCH AT VAR LOC.
11. HEATER VOLTAGE MEASUREMENTS MADE WITH HEATERS CONNECTED FOR 28V POWER SOURCE.
12. VOLTAGE MEASUREMENTS MADE WITH SIGNAL DATA CONVERTER CV-265/ARN-30A CONNECTED TO SET.

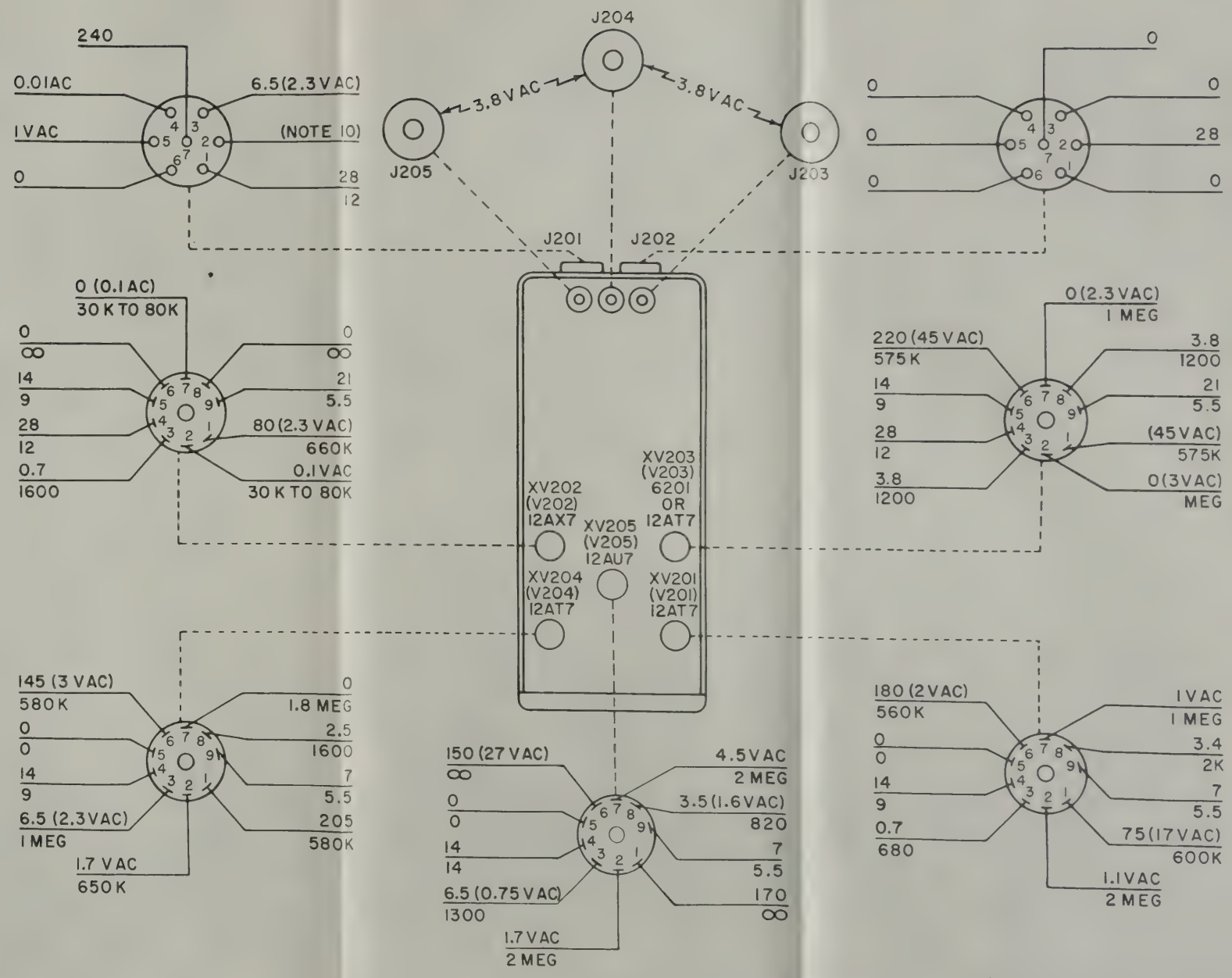
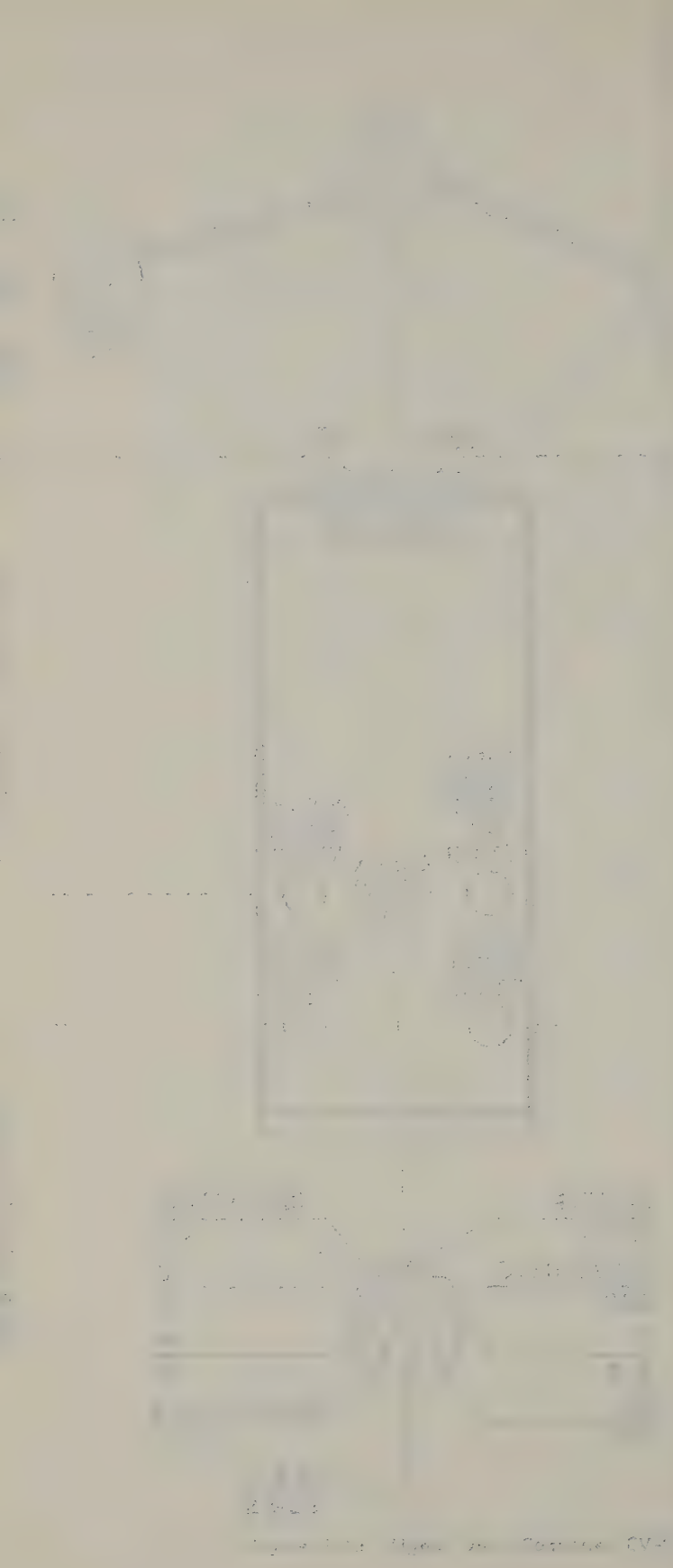
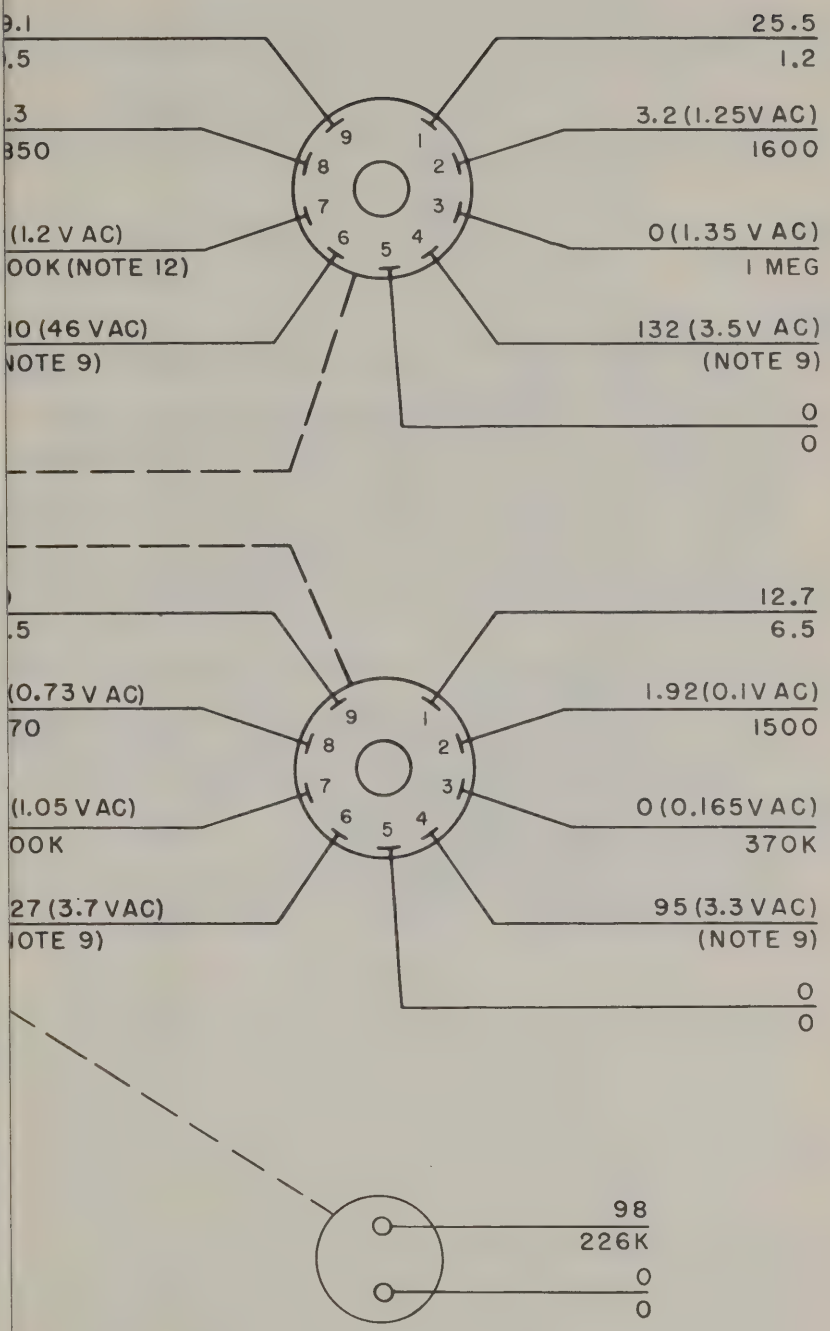


Figure 7-15. Signal Data Converter CV-265/ARN-30A, Terminal Voltage and Resistance Diagram





erter CV-265A/ARN-30A, Terminal Voltage and Resistance Diagram

NOTES:

1. VIEW IS BOTTOM OF CHASSIS.
2. ALL VOLTAGES ARE D-C, UNLESS OTHERWISE NOTED, AND APPEAR ABOVE THE REFERENCE LINE.
3. ALL RESISTANCE VALUES ARE IN OHMS (MULTIPLIERS: K=1000; MEG=1,000,000) AND APPEAR BELOW THE REFERENCE LINE.
4. ALL MEASUREMENTS MADE WITH RESPECT TO GROUND EXCEPT J201 AND J203 WHICH ARE MADE WITH RESPECT TO J202.
5. RESISTANCE MEASUREMENTS MADE WITH SIGNAL DATA CONVERTER CV-265A/ARN-30A DISCONNECTED FROM SET.
6. VOLTAGE MEASUREMENTS MADE WITH SIGNAL DATA CONVERTER CV-265A/ARN-30A CONNECTED IN SET. AND WITH HIGH VOLTAGE SUPPLIED BY DYNAMOTOR DY-86/ARN-30 INSTALLED ON RECEIVER R-445/ARN-30.
7. D-C VOLTAGE MEASUREMENTS MADE WITH MULTIMETER TS-352/U WITH LV+ SET AT 28 VOLTS.
8. A-C VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC MULTIMETER ME-6B/U, AND WITH "STANDARD" TEST SIGNAL LEVELS OF 1.8 VOLTS (±0.1 VOLT) AT 30 CPS, AND 1.8 VOLTS (±0.2 VOLT) AT 9960 CPS.
9. NO SIGNIFICANT MEASUREMENT DUE TO CAPACITOR CHARGING.
10. DEPENDS ON VALUE (SETTING) OF R222.
11. DEPENDS ON VALUE (SETTING) OF R226.
12. DEPENDS ON VALUE (SETTING) OF R250.
13. NO SIGNIFICANT MEASUREMENT. 1.8 VOLTS AC ON INPUT SIDE OF C236 WITH RELAY K201 ACTUATED.

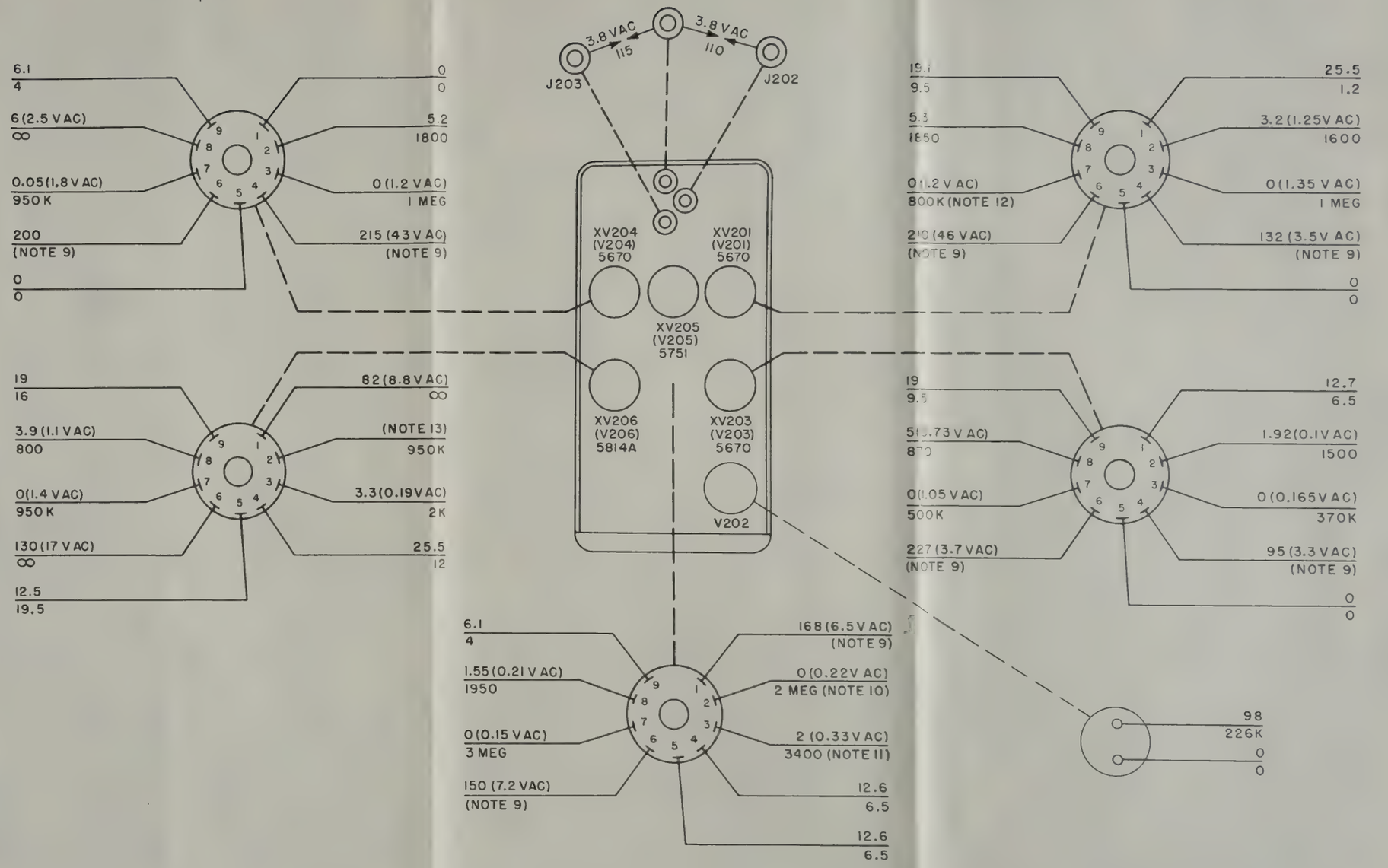
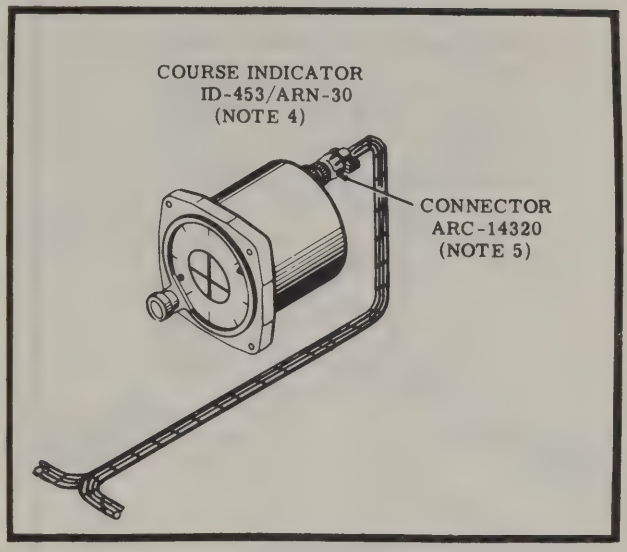


Figure 7-16. Signal Data Converter CV-265A/ARN-30A, Terminal Voltage and Resistance Diagram



ES:

TO ACCOMPLISH PROPER GROUNDING OF THE SYSTEM, CLEAN AIRCRAFT SURFACE TO WHICH MOUNTING MT-1174/ARN-30A IS ATTACHED (8 POINTS).

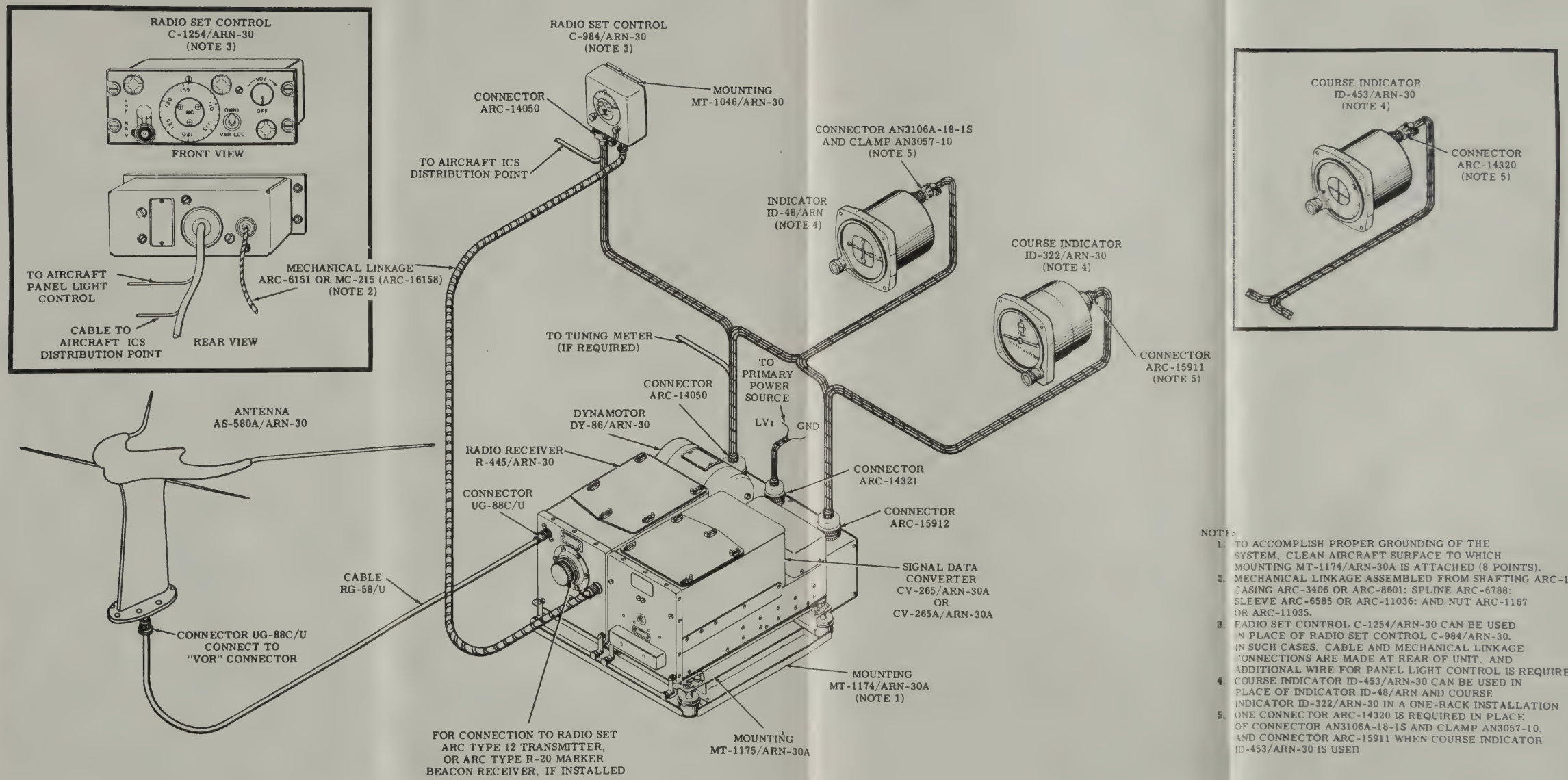
MECHANICAL LINKAGE ASSEMBLED FROM SHAFTING ARC-1174: CASING ARC-3406 OR ARC-8601: SPLINE ARC-6788: SLEEVE ARC-6585 OR ARC-11036: AND NUT ARC-1167 OR ARC-11035.

RADIO SET CONTROL C-1254/ARN-30 CAN BE USED IN PLACE OF RADIO SET CONTROL C-984/ARN-30. IN SUCH CASES, CABLE AND MECHANICAL LINKAGE CONNECTIONS ARE MADE AT REAR OF UNIT, AND ADDITIONAL WIRE FOR PANEL LIGHT CONTROL IS REQUIRED.

COURSE INDICATOR ID-453/ARN-30 CAN BE USED IN PLACE OF INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 IN A ONE-RACK INSTALLATION.

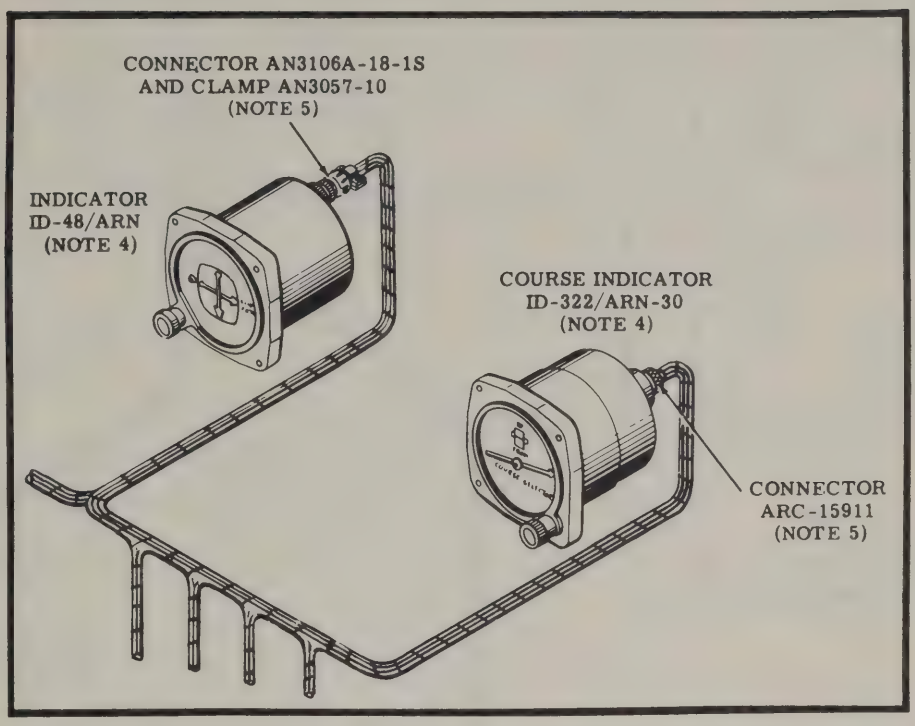
ONE CONNECTOR ARC-14320 IS REQUIRED IN PLACE OF CONNECTOR AN3106A-18-1S AND CLAMP AN3057-10, AND CONNECTOR ARC-15911 WHEN COURSE INDICATOR ID-453/ARN-30 IS USED.

k Installation, Intercabling Diagram



NOTES
1. TO ACCOMPLISH PROPER GROUNDING OF THE SYSTEM, CLEAN AIRCRAFT SURFACE TO WHICH MOUNTING MT-1174/ARN-30A IS ATTACHED (8 POINTS).
2. MECHANICAL LINKAGE ASSEMBLED FROM SHAFTING ARC-1174: CASING ARC-3406 OR ARC-8601: SPLINE ARC-6788: SLEEVE ARC-6585 OR ARC-11036: AND NUT ARC-1167 OR ARC-11035.
3. RADIO SET CONTROL C-1254/ARN-30 CAN BE USED IN PLACE OF RADIO SET CONTROL C-984/ARN-30. IN SUCH CASES, CABLE AND MECHANICAL LINKAGE CONNECTIONS ARE MADE AT REAR OF UNIT, AND ADDITIONAL WIRE FOR PANEL LIGHT CONTROL IS REQUIRED
4. COURSE INDICATOR ID-453/ARN-30 CAN BE USED IN PLACE OF INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 IN A ONE-RACK INSTALLATION.
5. ONE CONNECTOR ARC-14320 IS REQUIRED IN PLACE OF CONNECTOR AN3106A-18-1S AND CLAMP AN3057-10, AND CONNECTOR ARC-15911 WHEN COURSE INDICATOR ID-453/ARN-30 IS USED

Figure 7-17. One-Rack Installation, Intercabling Diagram



E INDICATOR
-453/ARN-30
NOTE 4)

CONNECTOR
ARC-14320
(NOTE 5)

CONNECTOR
ARC-16210

CABLE
RG-58/U

CONNECTOR
ARC-15912

CONNECTOR
UG-88C/U

CONNECTOR
ARC-15911

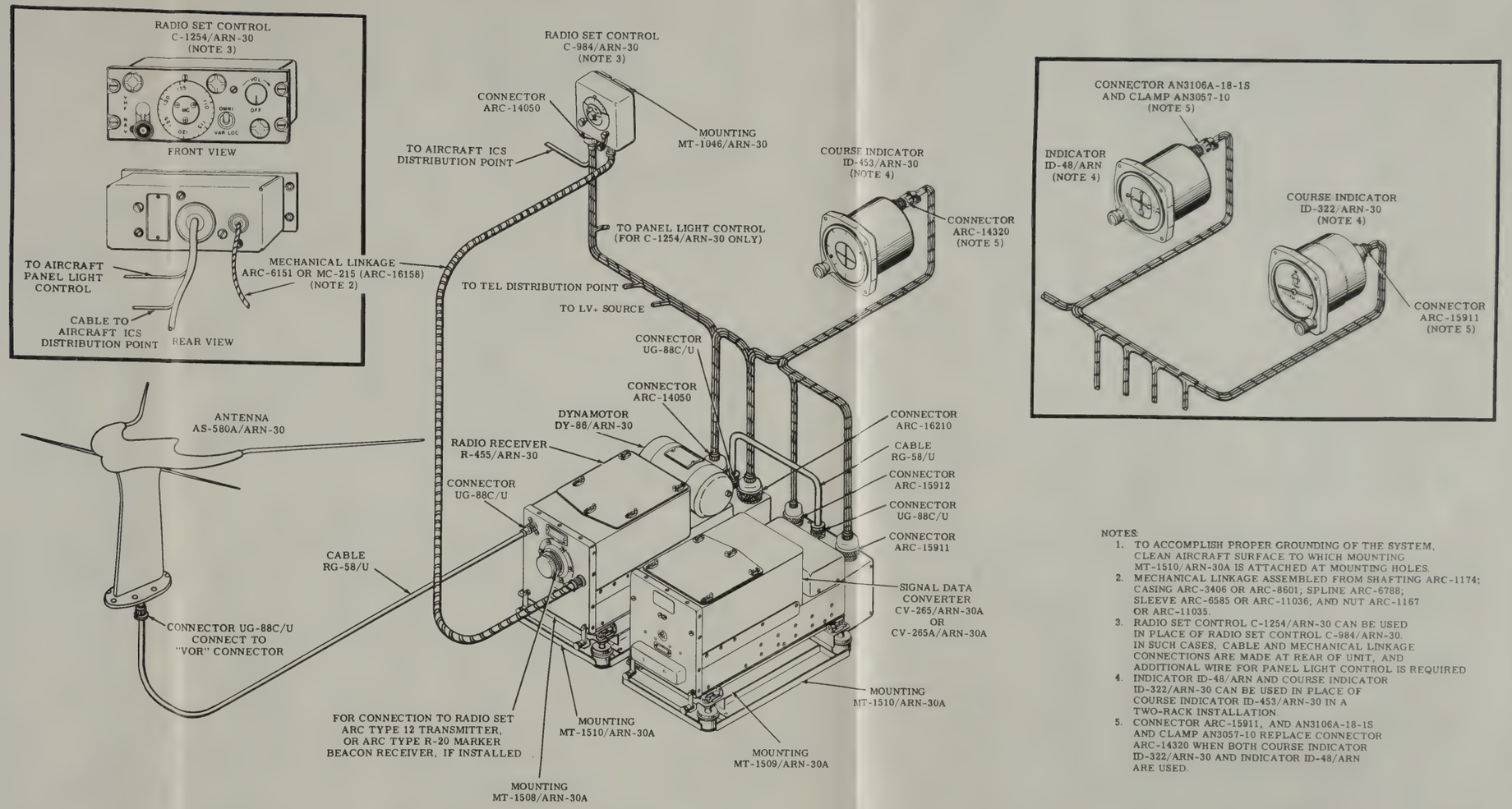
SIGNAL DATA
CONVERTER
CV-265/ARN-30A
OR
CV-265A/ARN-30A

MOUNTING
MT-1510/ARN-30A

NOTES:

1. TO ACCOMPLISH PROPER GROUNDING OF THE SYSTEM, CLEAN AIRCRAFT SURFACE TO WHICH MOUNTING MT-1510/ARN-30A IS ATTACHED AT MOUNTING HOLES.
2. MECHANICAL LINKAGE ASSEMBLED FROM SHAFTING ARC-1174; CASING ARC-3406 OR ARC-8601; SPLINE ARC-6788; SLEEVE ARC-6585 OR ARC-11036; AND NUT ARC-1167 OR ARC-11035.
3. RADIO SET CONTROL C-1254/ARN-30 CAN BE USED IN PLACE OF RADIO SET CONTROL C-984/ARN-30. IN SUCH CASES, CABLE AND MECHANICAL LINKAGE CONNECTIONS ARE MADE AT REAR OF UNIT, AND ADDITIONAL WIRE FOR PANEL LIGHT CONTROL IS REQUIRED.
4. INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 CAN BE USED IN PLACE OF COURSE INDICATOR ID-453/ARN-30 IN A TWO-RACK INSTALLATION.
5. CONNECTOR ARC-15911, AND AN3106A-18-1S AND CLAMP AN3057-10 REPLACE CONNECTOR ARC-14320 WHEN BOTH COURSE INDICATOR ID-322/ARN-30 AND INDICATOR ID-48/ARN ARE USED.

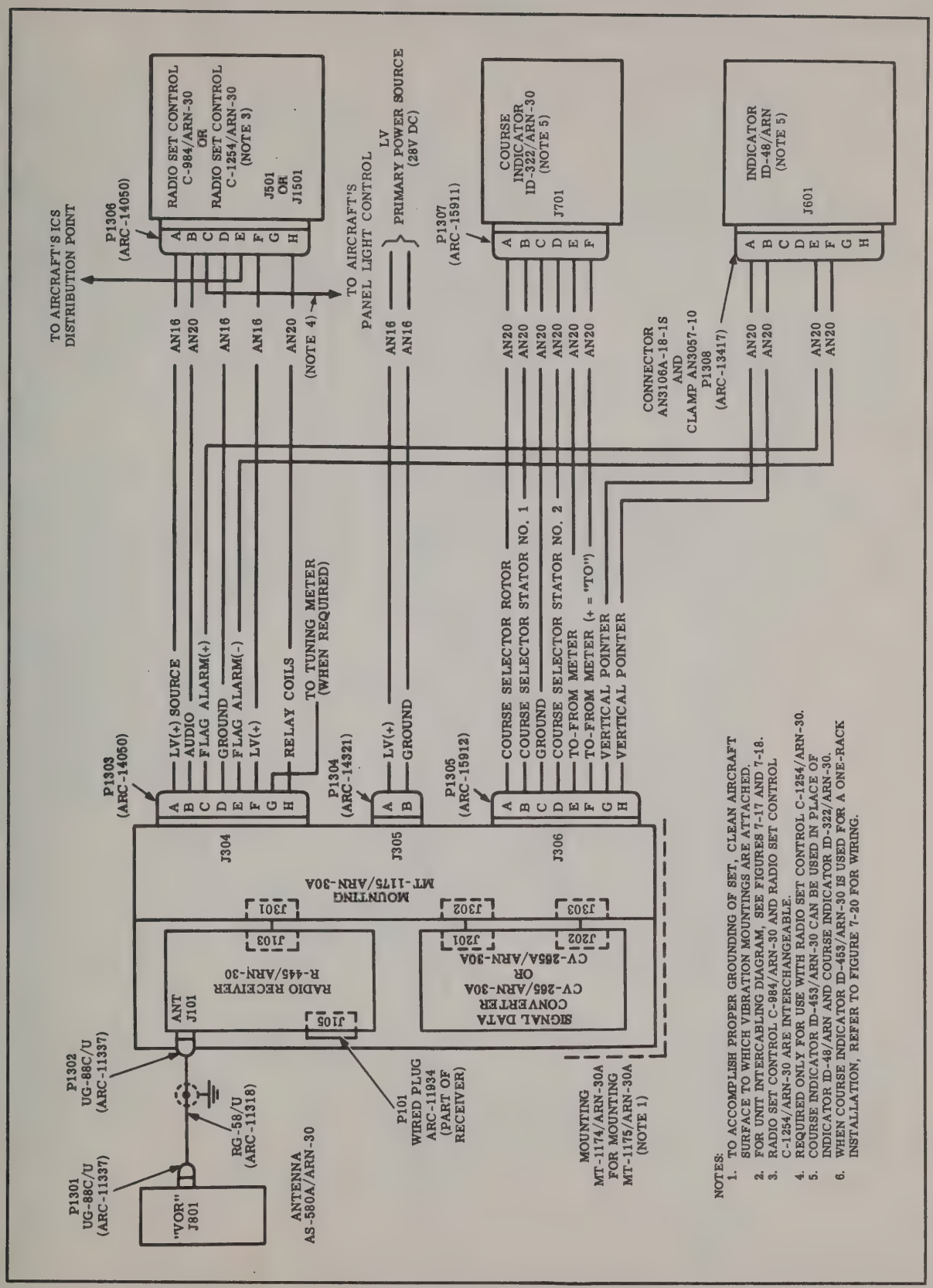
Figure 7-18. Two-Rack Installation, Intercabling Diagram



NOTES:

1. TO ACCOMPLISH PROPER GROUNDING OF THE SYSTEM, CLEAN AIRCRAFT SURFACE TO WHICH MOUNTING MT-1510/ARN-30A IS ATTACHED AT MOUNTING HOLES.
2. MECHANICAL LINKAGE ASSEMBLED FROM SHAFTING ARC-1174; CASING ARC-3406 OR ARC-8601; SPLINE ARC-6788; SLEEVE ARC-6585 OR ARC-11036; AND NUT ARC-1167 OR ARC-11035.
3. RADIO SET CONTROL C-1254/ARN-30 CAN BE USED IN PLACE OF RADIO SET CONTROL C-984/ARN-30. IN SUCH CASES, CABLE AND MECHANICAL LINKAGE CONNECTIONS ARE MADE AT REAR OF UNIT, AND ADDITIONAL WIRE FOR PANEL LIGHT CONTROL IS REQUIRED
4. INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 CAN BE USED IN PLACE OF COURSE INDICATOR ID-453/ARN-30 IN A TWO-RACK INSTALLATION.
5. CONNECTOR ARC-15911, AND AN3106A-18-1S AND CLAMP AN3057-10 REPLACE CONNECTOR ARC-14320 WHEN BOTH COURSE INDICATOR ID-322/ARN-30 AND INDICATOR ID-48/ARN ARE USED.

Figure 7-18. Two-Rack Installation, Intercabling Diagram



NOTES:
1. TO ACCOMPLISH PROPER GROUNDING OF SET, CLEAN AIRCRAFT SURFACE TO WHICH VIBRATION MOUNTINGS ARE ATTACHED.
2. FOR UNIT INTERCABLING DIAGRAM, SEE FIGURES 7-17 AND 7-18.
3. RADIO SET CONTROL C-984/ARN-30 AND RADIO SET CONTROL C-1254/ARN-30 ARE INTERCHANGEABLE.
4. REQUIRED ONLY FOR USE WITH RADIO SET CONTROL C-1254/ARN-30.
5. COURSE INDICATOR ID-453/ARN-30 CAN BE USED IN PLACE OF INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30.
6. WHEN COURSE INDICATOR ID-453/ARN-30 IS USED FOR A ONE-RACK INSTALLATION, REFER TO FIGURE 7-20 FOR WIRING.

Figure 7-19. One-Rack Installation, External Wiring Diagram

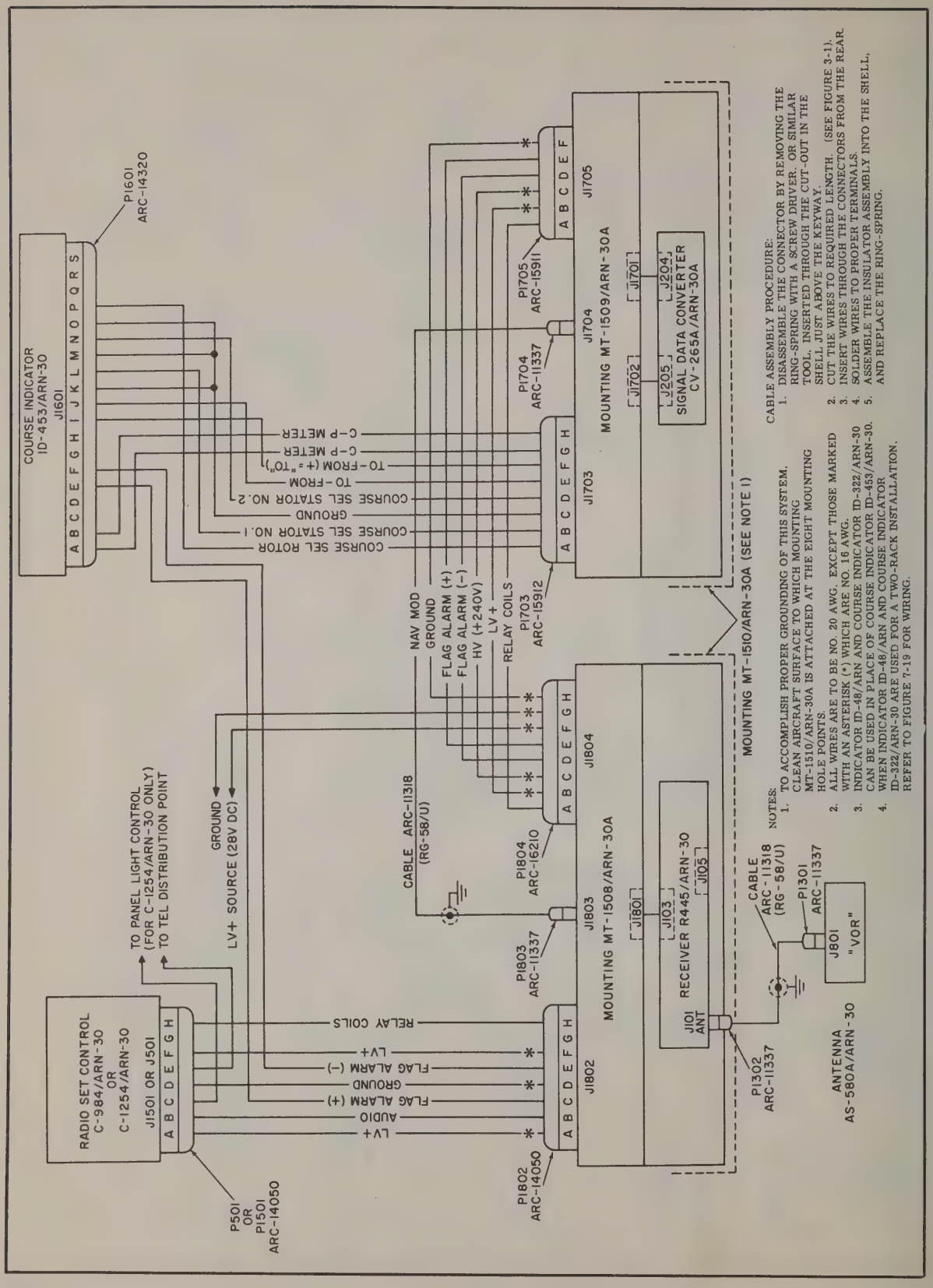
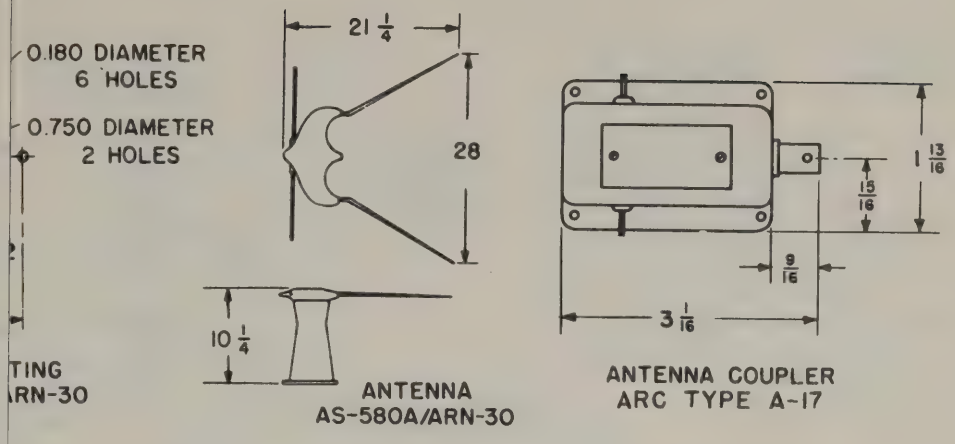
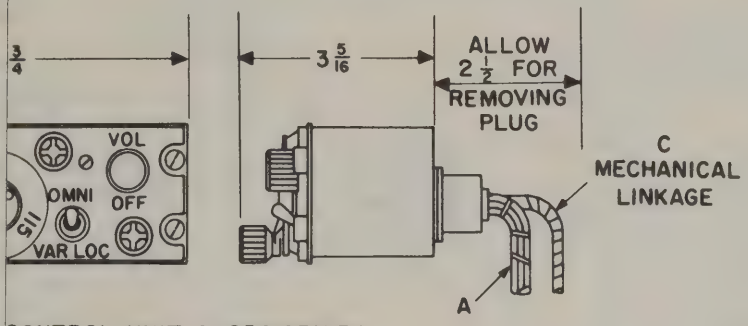
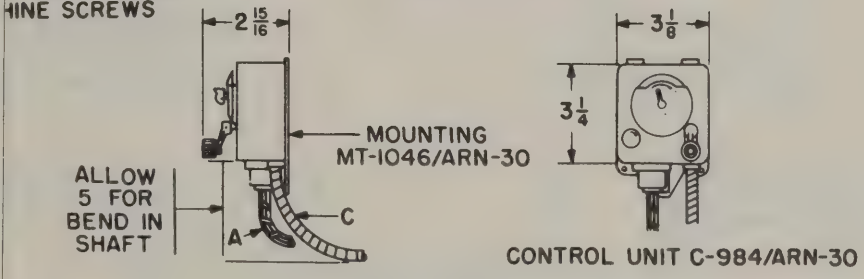

COURSE INDICATOR ID-453/ARN-30 J1601
A B C D E F G H I J K L M N O P Q R S
P1601 ARC-14320
COURSE SEL ROTOR
COURSE SEL STATOR NO. 1
GROUND
COURSE SEL STATOR NO. 2
TO-FROM
TO-FROM (+ = "TO")
C-P METER
C-P METER
NAV MOD
GROUND
FLAG ALARM (+)
FLAG ALARM (-)
HV (+240V)
LV+
RELAY COILS
P1703 ARC-15912
P1704 ARC-11337
P1705 ARC-15911
MOUNTING MT-1509/ARN-30A J1704 J1705
J1702 J1701 J205 J204
SIGNAL DATA CONVERTER CV-265A/ARN-30A
MOUNTING MT-1510/ARN-30A (SEE NOTE 1)
CABLE ARC-11318 (RG-58/U)
P1804 ARC-16210
MOUNTING MT-1508/ARN-30A J1803 J1804
J1801 J103 J105
RECEIVER R445/ARN-30 J101 ANT
P1803 ARC-11337
P1802 ARC-14050
P1302 ARC-11337
CABLE ARC-11318 (RG-58/U)
P1301 ARC-11337
J801 "VOR"
ANTENNA AS-580A/ARN-30
RADIO SET CONTROL C-984/ARN-30 OR C-1254/ARN-30 J1501 OR J501
A B C D E F G H
P501 OR P1501 ARC-14050
RELAY COILS
LV+
FLAG ALARM (-)
GROUND
FLAG ALARM (+)
AUDIO
LV+
TO PANEL LIGHT CONTROL (FOR C-1254/ARN-30 ONLY) TO TEL DISTRIBUTION POINT
LV+ SOURCE (28V DC)
GROUND
NOTES:
1. TO ACCOMPLISH PROPER GROUNDING OF THIS SYSTEM, CLEAN AIRCRAFT SURFACE TO WHICH MOUNTING MT-1510/ARN-30A IS ATTACHED AT THE EIGHT MOUNTING HOLE POINTS.
2. ALL WIRES ARE TO BE NO. 20 AWG. EXCEPT THOSE MARKED WITH AN ASTERISK (*) WHICH ARE NO. 16 AWG.
3. INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 CAN BE USED IN PLACE OF COURSE INDICATOR ID-453/ARN-30.
4. WHEN INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 ARE USED FOR A TWO-RACK INSTALLATION, REFER TO FIGURE 7-19 FOR WIRING.
CABLE ASSEMBLY PROCEDURE:
1. DISASSEMBLE THE CONNECTOR BY REMOVING THE RING-SPRING WITH A SCREW DRIVER, OR SIMILAR TOOL. INSERTED THROUGH THE CUT-OUT IN THE SHELL JUST ABOVE THE KEYWAY.
2. CUT THE WIRES TO REQUIRED LENGTH. (SEE FIGURE 3-1).
3. INSERT WIRES THROUGH THE CONNECTORS FROM THE REAR.
4. SOLDER WIRES TO PROPER TERMINALS.
5. ASSEMBLE THE INSULATOR ASSEMBLY INTO THE SHELL, AND REPLACE THE RING-SPRING.

Figure 7-20. Two-Rack Installation, External Wiring Diagram





CONTROL UNIT C-1254/ARN-30



CONTROL UNIT C-984/ARN-30

IN INCHES.

Figure 7-21. Dimensions of Units

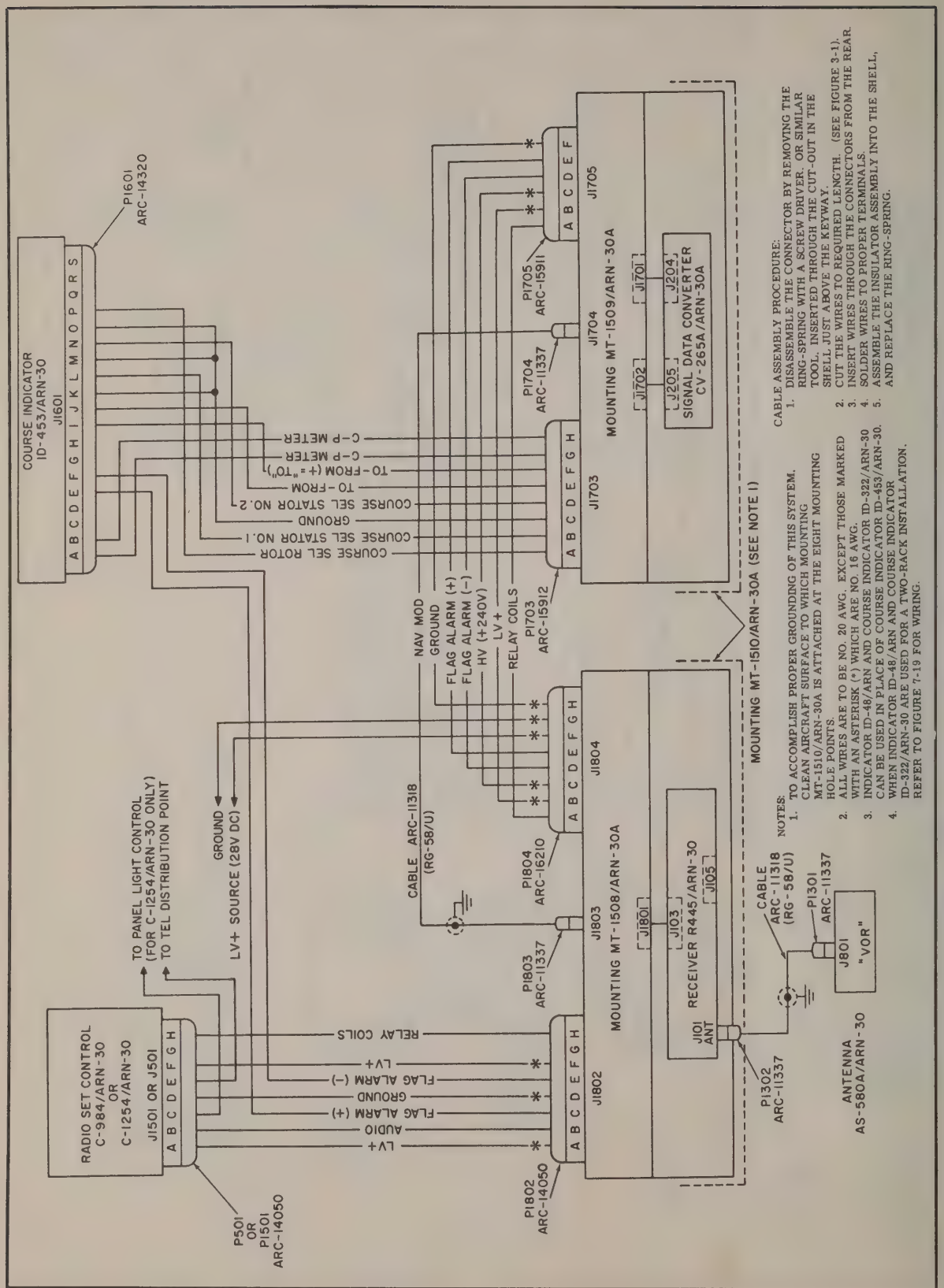
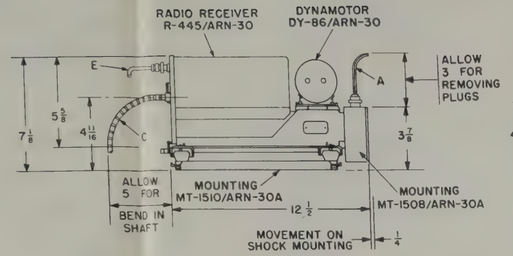
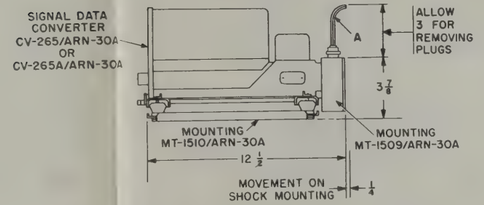
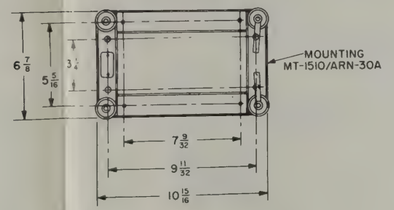
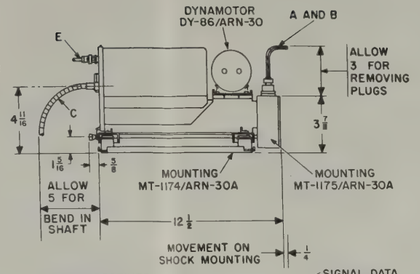

COURSE INDICATOR ID-453/ARN-30 J1601
A B C D E F G H I J K L M N O P Q R S
P1601 ARC-14320
C-P METER
C-P METER
TO-FROM (+ = "TO")
TO-FROM
COURSE SEL STATOR NO. 2
GROUND
COURSE SEL STATOR NO. 1
COURSE SEL ROTOR
NAV MOD
GROUND
FLAG ALARM (+)
FLAG ALARM (-)
HV (+240V)
LV+
RELAY COILS
P1703 ARC-15912
P1704 ARC-11337
P1705 ARC-15911
J1703
J1704
J1705
MOUNTING MT-1509/ARN-30A
J1702
J1701
J205
J204
SIGNAL DATA CONVERTER CV-265A/ARN-30A
MOUNTING MT-1510/ARN-30A (SEE NOTE 1)
CABLE ARC-11318 (RG-58/U)
P1804 ARC-16210
J1804
MOUNTING MT-1508/ARN-30A
J1801
J103
J105
RECEIVER R445/ARN-30
J101 ANT
P1803 ARC-11337
J1803
J1802
P1802 ARC-14050
RELAY COILS
LV+
FLAG ALARM (-)
GROUND
FLAG ALARM (+)
AUDIO
LV+
RADIO SET CONTROL C-984/ARN-30 OR C-1254/ARN-30
J1501 OR J501
A B C D E F G H
P501 OR P1501 ARC-14050
TO PANEL LIGHT CONTROL (FOR C-1254/ARN-30 ONLY)
TO TEL DISTRIBUTION POINT
GROUND
LV+ SOURCE (28V DC)
P1302 ARC-11337
CABLE ARC-11318 (RG-58/U)
P1301 ARC-11337
J801 "VOR"
ANTENNA AS-580A/ARN-30
NOTES:
1. TO ACCOMPLISH PROPER GROUNDING OF THIS SYSTEM, CLEAN AIRCRAFT SURFACE TO WHICH MOUNTING MT-1510/ARN-30A IS ATTACHED AT THE EIGHT MOUNTING HOLE POINTS.
2. ALL WIRES ARE TO BE NO. 20 AWG, EXCEPT THOSE MARKED WITH AN ASTERISK (*) WHICH ARE NO. 16 AWG.
3. INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 CAN BE USED IN PLACE OF COURSE INDICATOR ID-453/ARN-30.
4. WHEN INDICATOR ID-48/ARN AND COURSE INDICATOR ID-322/ARN-30 ARE USED FOR A TWO-RACK INSTALLATION, REFER TO FIGURE 7-19 FOR WIRING.
CABLE ASSEMBLY PROCEDURE:
1. DISASSEMBLE THE CONNECTOR BY REMOVING THE RING-SPRING WITH A SCREW DRIVER, OR SIMILAR TOOL, INSERTED THROUGH THE CUT-OUT IN THE SHELL JUST ABOVE THE KEYWAY.
2. CUT THE WIRES TO REQUIRED LENGTH. (SEE FIGURE 3-1).
3. INSERT WIRES THROUGH THE CONNECTORS FROM THE REAR.
4. SOLDER WIRES TO PROPER TERMINALS.
5. ASSEMBLE THE INSULATOR ASSEMBLY INTO THE SHELL, AND REPLACE THE RING-SPRING.

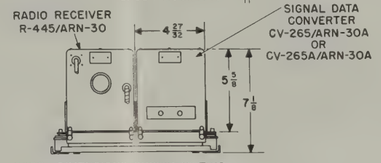
Figure 7-20. Two-Rack Installation, External Wiring Diagram



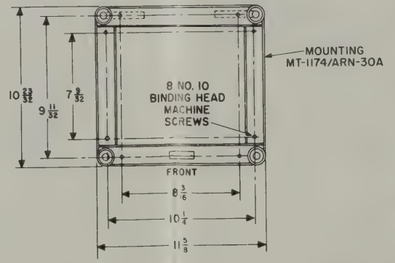


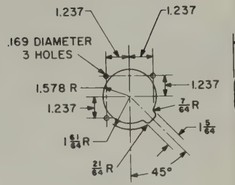


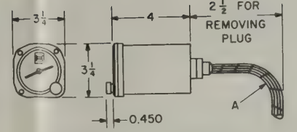




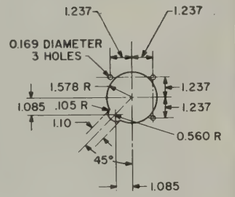
NOTE: DIMENSIONS SHOWN IN THIS VIEW APPLY TO EITHER SINGLE- OR DUAL-RACK INSTALLATION.

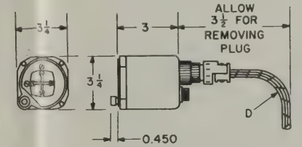




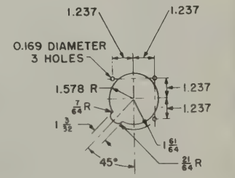


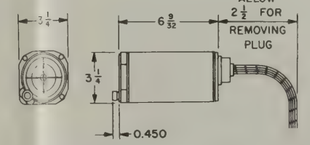
COURSE INDICATOR ID-322/ARN-30



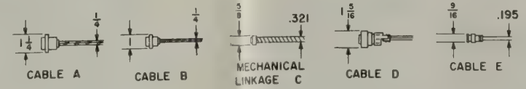


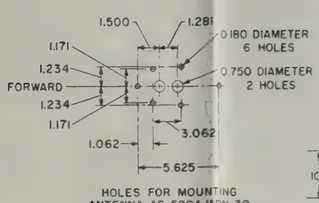
INDICATOR ID-48/ARN



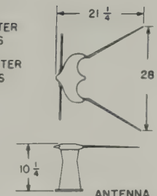


COURSE INDICATOR ID-453/ARN-30

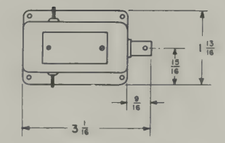




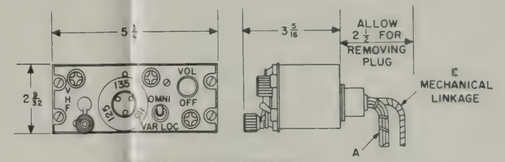
HOLES FOR MOUNTING ANTENNA AS-580A/ARN-30



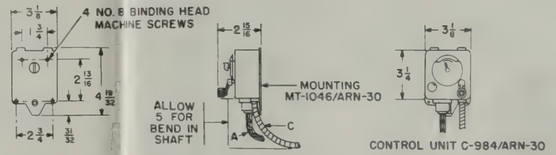
ANTENNA AS-580A/ARN-30



ANTENNA COUPLER ARC TYPE A-17



CONTROL UNIT C-1254/ARN-30



CONTROL UNIT C-984/ARN-30

NOTE:
ALL DIMENSIONS ARE IN INCHES.

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